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Pygospionida.

Nat. Ant. Exped.

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15 June, 1907.

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Mar. Inv.

National Antarctic Expedition

NATURAL HISTORY

VOL. III.

PYCNOGONIDA

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By T. V. Hodgson, F.L.S.

WITH TEN PLATES



1907

PYCNOGONIDA.

By T. V. HODGSON, F.L.S.

(10 Plates.)

THE collection of Pycnogonids brought from the Antarctic by the 'Discovery' is a large one, including as it does no less than twenty-eight species, three of which have been assigned to as many new genera. Only one species can be regarded as of morphological importance, *Pentanymphe antarcticum*, which is now known to be abundant and to have a circumpolar distribution. It differs from the genus *Nymphon* only in the possession of an additional pair of legs. At first this was thought to be quite a novel feature in the morphology of the Pycnogonida, but the Scotch expedition brought another and much finer species from the South Orkneys. This proved to be identical with *Decolopoda australis*, described by Eights some seventy years ago, and taken at the South Shetlands. Eights' work was lost for a long time, and though it has been noticed recently by modern zoologists, the reception afforded it was extremely curious, involving as it did the point-blank refusal to accept the possibility of the existence of a Pycnogonid with more than the orthodox four pairs of legs. Mr. L. J. Cole (7), who apparently looked with more sympathy on the work of a fellow-countryman, was the first to appreciate this discovery properly. The genus *Leionymphon* was defined by Professor Möbius for a large but immature specimen taken by the 'Valdivia' in the vicinity of Bouvet Island. It has been found necessary to re-cast this genus; as now defined it contains no less than eight species, including two which had been assigned to the genus *Ammothoea*, and another which Professor Möbius thought should be placed in the genus *Colossendeis*. No less than five species were taken by the 'Discovery,' and four of them are new. No true member of the genus *Ammothoea* was seen, but two new species assigned to new genera, *Austrodecus* and *Austroraptus*, belong, as does the genus *Leionymphon*, to the family *Ammothoidæ* as defined by Professor G. O. Sars.

Austrodecus is perhaps a close relation of *Tanystylum*, Miers, and is a curious little form with a slender and elongated proboscis, like the snout of a weevil beetle, no chelifori, six jointed palps, and small ovigers. *Austroraptus* is remarkable for its spurred body and the length of its legs.

Rhynchothorax australis is another curious form; the only other species of the genus is found in the Mediterranean, but, notwithstanding certain differences, there does not seem to be any justification for giving the 'Discovery' species other than specific rank.

The remainder of the collection falls into well-known genera, and does not call for any special comment. A list is appended below of all the species now known from the Antarctic and sub-Antarctic regions, those taken by the 'Discovery' being marked with an asterisk. The numerous islands scattered about the southern seas have long been considered to pertain to the sub-Antarctic region, and for this reason I have made the mean annual isotherm of 45° F., as indicated by Sir John Murray in the concluding volume of the "Challenger Reports," its northern limit. This includes all that can reasonably be considered as belonging to this region, and coincides very closely with the opinion expressed by Professor P. Pelseneer in his Report on the *Mollusca* of the 'Belgica' Expedition. For the Antarctic proper the latitude 60° S. seems sufficient as it includes all the glaciated lands of Antarctica, and the shallower waters less than 1000fm., connected therewith.

	Antarctic.	Sub-Antarctic.
<i>Pycnogonum magellanicum</i> , Hoek		×
" <i>magnirostre</i> , Möbius		×
* <i>Phoxichilus australis</i>	×	
<i>Pallene dimorpha</i> , Hoek		×
* <i>Pseudopallene cornigera</i> , Möbius	×	×
* " <i>australis</i>	×	
<i>Pallenopsis patagonica</i> , Hoek		×
* " <i>pilosa</i> , Hoek	×	×
" <i>fluminensis</i> , Kröyer		×
* " <i>glabra</i> , Möbius	×	×
* " <i>villosa</i>	×	
* " <i>hiemalis</i>	×	
<i>Anoplodactylus neglectus</i> , Hoek		×
" <i>petiolatus</i> , Kröyer		×
<i>Nymphon gracile</i> , Leach		×
" <i>gracilipes</i> , Miers		×
" <i>brachyrhynchum</i> , Hoek		×
" <i>hamatum</i> , Hoek		×
" <i>fuscum</i> , Hoek		×
" <i>meridionale</i> , Hoek	×	
" <i>antarcticum</i> , Pfeffer		×
* " <i>hiemale</i>	×	
* " <i>lanare</i>	×	
* " <i>adareanum</i>	×	
* " <i>frigidum</i>	×	
<i>Chaetonymphon brevicaudatum</i> , Miers		×
* " <i>villosum</i>	×	
* " <i>biarticulatum</i>	×	
* " <i>mendosum</i>	×	
" <i>australe</i> , Hodgson	×	
* " " <i>var. austrinorum</i>	×	
* <i>Pentonymphon antarcticum</i>	×	
<i>Leionymphon striatum</i> , Möbius		×
* " <i>grande</i> , Pfeffer	×	×
" <i>gibbosum</i> , Möbius		×
* " <i>minus</i>	×	

									Antarctic.	Sub-Antarctic.
	<i>Leionymphon clausii</i> , Pfeffer.	.	.	.	.	.	.	.		×
*	" <i>australe</i> .	.	.	.	.	.	.	.	×
*	" <i>glaciale</i> .	.	.	.	.	.	.	.	×
*	" <i>spinosum</i> .	.	.	.	.	.	.	.	×
	<i>Ammonothea hoeki</i> , Pfeffer	.	.	.	.	.	.	.		×
	" <i>wilsoni</i> , Schimkewitsch	.	.	.	.	.	.	.		×
	" <i>communis</i> , Bouvier	.	.	.	.	.	.	.	×
	" <i>curculio</i> , Bouvier	.	.	.	.	.	.	.	×
	<i>Tanystylum styligerum</i> , Miers	.	.	.	.	.	.	.		×
	" <i>dohrnii</i> , Pfeffer	.	.	.	.	.	.	.		×
	" <i>chierchiaë</i> , Schimkewitsch	.	.	.	.	.	.	.		×
*	<i>Austrodecus glaciale</i> .	.	.	.	.	.	.	.	×
*	<i>Austroraptus polaris</i> .	.	.	.	.	.	.	.	×
	<i>Ascorhynchus glaber</i> , Hoek	.	.	.	.	.	.	.		×
*	<i>Rhynchothorax australis</i> .	.	.	.	.	.	.	.	×
	<i>Colossendeis gigas</i> , Hoek	.	.	.	.	.	.	.		×
	" <i>leptorhynchus</i> , Hoek	.	.	.	.	.	.	.		×
	" <i>gigas leptorhynchus</i> , Hoek	.	.	.	.	.	.	.		×
	" <i>megalonyx</i> , Hoek	.	.	.	.	.	.	.		×
	" <i>robusta</i> , Hoek	.	.	.	.	.	.	.		×
	" <i>gracilis</i> , Hoek	.	.	.	.	.	.	.		×
*	" <i>australis</i> .	.	.	.	.	.	.	.	×
*	" <i>glacialis</i> .	.	.	.	.	.	.	.	×
*	" <i>frigida</i> .	.	.	.	.	.	.	.	×
*	" <i>rugosa</i> .	.	.	.	.	.	.	.	×
	<i>Decolopoda† australis</i> , Eights	.	.	.	.	.	.	.	×
	" <i>antarctica</i> , Bouvier	.	.	.	.	.	.	.	×

C. gibbosa Möbius, 1902.

No less than seven expeditions have taken part in the recent "Siege of the South Pole," and the collections of Pycnogonids made by four of them still remain unpublished. This being the case, it is scarcely desirable to enter into a discussion on the geographical distribution of these animals. It may, however, be stated that the head-quarters of these animals appears to be in southern seas. Professor Möbius (22) has compiled a list of the known Arctic and sub-Arctic species, which number forty-two. In the same work, for comparison, he has added a list of all the species taken beyond 30° South latitude. Only thirty-one species are included in this large area, and the genus *Tanystylum* is the only one occurring in the south which does not occur in the north. I have reduced the Southern or Antarctic area to what I consider more reasonable dimensions, and the 'Discovery' collection, with its predecessors, raises the total to sixty-three species. Among these species there are five new genera; four of these are, as far as is yet known, confined exclusively to the Antarctic region, the other extends well into the sub-Antarctic region. The "Bipolarity Theory" is only affected by a single species, *Colossendeis australis*. Of all the numerous species of this genus, *C. proboscidea*, from the north, and *C. australis*, from the south, stand apart from all the rest on account of their bodily form, and there can be no question that they are much more nearly related to each other than

† [As Eights said his species had "five perfect pairs" of legs he doubtless meant to write *Decaholopoda*.—ED.]

to any other members of the genus. The two species, as species are recognised now-a-days, are perfectly distinct, but it is a fair question to ask how is their present position at the opposite ends of the earth to be accounted for?

As to the terms employed in the following work, some words of explanation are necessary.

Naturalists have not always used the same terminology, and Mr. L. J. Cole (6) has recently tabulated the essential variations. As, however, the terms used by any one naturalist have not been fully adopted, and others have been introduced, a complete account of the terminology used here is given.

The entire Body of a Pycnogonid is divisible into three regions—the proboscis, trunk, and abdomen—and this without regard to any of the appendages. Where the body only is alluded to, it is to be understood that both the trunk and abdomen are taken together. Measurements are taken dorsally, unless otherwise specified, except in the case of the appendages, which are generally measured from the side, and the length of the trunk is usually taken to the base of the abdomen; in exceptional cases, where the abdomen is vertical or very short, the trunk may be measured to the extremity of the posterior lateral processes, but this is so stated. Its width is always across the longest of the lateral processes.

The Cephalon is regarded as that portion of the trunk which lies in front of the first pair of lateral processes, and the so-called neck is the narrowest part, sometimes elongated, between those processes and the more expanded distal portion.

Segmentation is not regarded as perfect or complete unless the four segments of the trunk and the abdomen are distinctly articulated.

The first appendage of the trunk is the Cheliforus, also commonly known as the mandible. A considerable amount of confusion has been, and is still likely to be, caused by the fact that the chela has most frequently been regarded as a single joint. Obviously it consists morphologically of two joints, and in order to avoid any misapprehension as to the number of joints, this appendage has been described as chelate, or otherwise, and the scape, a name given by Professor G. O. Sars to the shaft supporting the chela, has been recorded as one- or two-jointed, as the case might be. This method of dealing with the limb is suggested in order to avoid confusion as to the number of joints it possesses.

The second appendage is the Palp.

The third appendage is the Oviger. This convenient name was given by Mr. L. J. Cole to replace the more cumbrous term “ovigerous,” or “false leg.” In these two appendages the various joints are numbered from the base, and not named.

The remaining four or five pairs of appendages are Legs pure and simple; with the use of the word “oviger,” the qualification “ambulatory” or “walking leg” becomes quite unnecessary. The terms used for the individual joints are those adopted by Professor G. O. Sars, viz., first, second and third coxa, femur, first and second tibia, tarsus and propodus.

A projection beyond the insertion of the terminal claw, which occurs in some species, is called the Heel, a term introduced by Mr. L. J. Cole. Two other expressions have been adopted for purposes of convenience. In very many species, not to say genera, there occurs a thickening of the skin on the sides of the legs, not infrequently also on some of the other appendages; this takes the form of a narrow and conspicuous line, usually of a reddish colour, and so it has been termed the "lateral line." The other feature concerns the setæ. At the extremity of most of the joints there is a fringe of more or less specialised setæ, sometimes surrounding the joint, but frequently more conspicuous on the dorsal or the ventral aspect. This has been termed the distal fringe, a name which does not appear to be inappropriate.

Precise measurements are invariably necessary with regard to the legs. One leg is generally considered to be sufficient for this purpose, and as Dr. P. P. C. Hoek adopted the third leg of the right side for this purpose wherever possible, the same limb has been used here.

PHOXICHILUS.

This genus is readily distinguished by its slender form and the complete absence of chelifori and palps. The ovigers too only occur in the male, and are seven-jointed. Among other characters may be mentioned the presence of a "collar" between the cephalon and the proboscis. This, however, is deficient in the species described below.

Numerous species have been assigned to this genus, but the difficulties of species discrimination is increased by the absence of two of the normal number of appendages, and necessitates some modification of the generic characters. No less than six species have been described from European seas, but their specific distinctness is open to question. Three others have been found in distant seas, and a fourth now described is from the extreme south.

PHOXICHILUS AUSTRALIS.

(Plate I., fig. 1.)

Specific characters :—

Body slender, with lateral processes very widely separated and with the long legs completely covered with very minute stiff setæ.

Tarsus with a very prominent ventral spine, and three to five proximally on the propodus, which projects distinctly beyond the insertion of the terminal claw and auxiliaries.

No distinct collar anteriorly to cephalon.

Body slender, with the lateral processes long and very widely separated; perfectly smooth to unassisted vision, but with a 1-in. objective extremely minute spines can be detected; segmentation very prominent and immediately behind each pair of lateral processes.

The Cephalon is small, but stouter than the trunk, truncated anteriorly with the angles bevelled off. No collar exists as such, but a band of thin chitinous skin, characteristic of an articulation, occurs between the cephalon and the base of the proboscis.

The Ocular tubercle lies almost in the middle of the cephalon, but scarcely clear of the first pair of lateral processes. It is very stout, of no great elevation, terminating in a strong cone above the four eyes.

The Abdomen is small, cylindrical, terminating in a cone, and directed almost vertically upwards. It is not articulated to the trunk.

The length of the trunk is 5mm. (to extremity of posterior lateral processes) and its extreme width is 3mm.

The Proboscis is long and slender, scarcely 4mm. in length, flexibly united to the trunk. It is cylindrical, but very slightly swollen before the middle and equally slightly narrowed before its rounded extremity. The mouth is inconspicuous, but of normal size. The proboscis is covered, more especially distally, with extremely minute spines.

The Legs are long and slender, attaining a length of 30mm. The first coxa is the smallest, and the second is a trifle longer than the first and third together; the proportions of the three following joints are as 8 : 6.75 : 8.5; the tarsus is very small, and the propodus, which is curved, is about a quarter the length of the femur. The entire limb, as the trunk, is completely clothed with extremely minute stiff setæ, which for the most part are only visible with a powerful lens. On the tibia they are, however, rather more conspicuous, besides being most abundant. The larger or ventral surface of the tarsus is covered with short spines, but one distal one is extremely large and prominent. Dorsally the propodus is covered with the minute stiff setæ, ventrally there are at the proximal end of the joint three to five very large spines, the remainder of that surface being occupied by a band of much smaller though still conspicuous spines of rather irregular size. A prominent heel projects over the insertion of a powerful terminal claw and its two auxiliaries, these latter being about half its length; but much more slender. The second coxa bears dorsally, just beyond the middle of its length, a tubercular enlargement, which is perforated by a glandular opening.

The genital apertures occur on a transverse ridge at the extremity of the second coxa of every leg. Ventrally, in the angle formed by the first pair of lateral processes and the trunk, there is a very small but distinct process on each side, exactly in the position where the oviger should be.

This type specimen is a female, and was taken off Flagon Point in Winter Quarters in 5-20 fm., on very rough ground.

Two other females were taken, one slightly larger than the type came from 125 fm., on a bottom composed of small stones and organic debris; the other is much smaller, but the precise point at which it was captured in Winter Quarters remains uncertain. A fourth specimen is a male, and is to a considerable extent overgrown with polyzoa. This specimen was taken at the same time and place as the type. It is sexually mature, and the genital apertures occur on the three posterior legs only. The ovigers are well-developed, but unfortunately only four basal joints remain on either side. They arise in the angle formed by the first lateral process and the trunk,

but not on a body process ; the first joint is small, the second is a little longer, the two following which are longer still, the fourth is largest. The appendage bears a moderate number of minute setæ.

I have been unable to distinguish the cement glands on the femur as described and figured by Professor G. H. Carpenter for other species. (4 and 5.)

PSEUDOPALLENE.

This genus, established by Mr. E. B. Wilson in 1878, has been more completely defined in accordance with modern requirements by Professor G. O. Sars (25). It is very closely allied to *Cordylochele* (G. O. Sars), but the special features which distinguish it from that genus are (a) the crown of setæ at the distal extremity of the proboscis ; (b) the presence of spines on the body and legs.

Two species are now described, one of which I regard for the present as identical with those derived from the 'Valdivia' and 'Français' Expeditions.

PSEUDOPALLENE CORNIGERA.

(Plate I., fig. 3.)

Pseudopallene cornigera, Möbius (23). p. 186.

Cordylochele turqueti (?), Bouvier (2). p. 297.

Specific characters :—

Body with long lateral processes not very widely separated, these armed dorsally with a stout spur. A pair of similar spurs on the cephalon.

Legs with longitudinal rows of setæ set in small tubercular bases. Propodus well covered with setæ and a proximal group ventrally of half-a-dozen spines.

Oviger ten-jointed. Denticulate spines with three strong teeth at the base.

Body rather robust, with long lateral processes not very widely separated. The length of these processes is increased by a very prominent spur which occurs dorsally on each.

A very conspicuous spur occurs on the antero-lateral border of the Cephalon. This is rather long, with a definitely constricted neck, and widens considerably into two lobes bearing the chelifori, and between which the proboscis arises.

The Ocular tubercle is short and stout, rounded above, and bears four well-developed eyes. It lies between the first pair of lateral processes and the neck.

The Abdomen is of normal proportions, gently tapering, and not articulated to the trunk. It is directed upwards, but does not extend beyond the posterior lateral processes, and bears a few minute setæ. The segmentation is distinct.

The length of the body is 6mm., and its extreme width is barely 5mm.

The Proboscis is ventral in origin, rising apparently from a pocket between the chelifori, directed obliquely downwards. It is a little longer than the cephalic segment gently tapering to a blunt point, the small triangular mouth being surrounded by a tuft of small bristles.

The Chelifori are well-developed; the scape is single-jointed, about two-thirds the length of the proboscis, enlarged at its distal extremity, and carries a few minute setæ. The chelæ are massive, curved almost to a right angle near their bases, and thickly covered with minute setæ. The fingers are short and massive, the immovable one bears two tubercles distally, but the movable one has none.

Palps are not present, but on either side of the cephalon ventrally, and just outside the chelifori, there is a small mark, an indication of where they should be. The antero-ventral margin of the cephalon is a slightly curved line.

The Ovipositor (fig. 3) is ten-jointed, and is built on much the same lines as in the genus *Nymphon*. It arises on a very small body-process between the neck and the first lateral process. The first three joints are small and progressively increase in length, the third being slightly curved and having a very oblique distal termination. The fourth joint is rather longer than the three preceding ones together; it is stout, curved, and like them, scantily supplied with small setæ. The fifth joint is very long and slender; owing to the curves it is difficult to measure precisely, but it appears to be as long as or longer than the preceding four joints. Its distal half bears a bunch of about forty large eggs, and is terminated by a short lobe. The sixth joint is quite short; the seventh and eighth are longer and sub-equal; the ninth and tenth progressively shorten, but only by a very little, the last one being slightly curved. The terminal claw is worn down to a stump, but appears to have been slender. The four terminal joints each bear a row of denticulate spines and a few small setæ dorsally. The spines are much worn, and only a flattened ovate leaf can be distinguished, with traces of three or four lateral teeth.

Fig. 3a is from a younger specimen.

The Legs are not very long, only attaining a length of about 23mm. Of the three coxæ the second is quite as long as the other two together, and is enlarged distally. The first shows a trace of a distal spur which gives it a rather angular appearance, and the setæ of the distal fringe arise for the most part on tubercular enlargements of the joint. On the second coxa the setæ are linear and dorsal, those of the mid-dorsal row are socketed into small tubercular enlargements of the joint. The third coxa bears a few small setæ dorsally, and a poorly developed distal fringe ventrally. The three following joints are very nearly equal in length, *circ.* 5mm., but the advantage is with the second tibia. On the femur there are five rows of setæ dorsally and laterally, three of which are readily seen, the setæ usually arising from a small tubercle; the other two rows are less conspicuous and contain fewer setæ. In the mid-ventral line there is a row of comparatively stout tubercles. On the two tibiæ the setæ are very much more numerous, and their linear arrangement and tubercular bases are less distinct. They cover both dorsal and ventral surfaces, but a space above the lateral line is left bare. The lateral line is distinct from the first coxa to the end of the second tibia. The distal fringes, though present, are composed of setæ of moderate size, and are therefore inconspicuous. The tarsus is very small and cup-shaped, its ventral surface being

completely covered with stiff setæ, largest distally. The propodus is curved, with a very distinct swelling ventrally at the proximal end; this swelling bears half-a-dozen strong spines, the rest of the ventral surface being occupied by a band of stout spinous setæ about half the size of the proximal group. Dorsally the setæ are fewer and weaker, a narrow space appears devoid of them laterally. The terminal claw is long and slender, about two-thirds the length of the propodus, to which it is articulated at the ventral angle. There are no auxiliaries, and the projecting heel is small.

The Genital apertures of the male occur on the second coxæ of the two posterior pairs of legs; in the female they occur on all the legs, on a conspicuous swelling of the coxa.

The adult male bearing ova, described above, was taken in Winter Quarters in 125 fathoms, on a bottom of small stones and organic débris (June 6, 1903). A smaller specimen, taken at the same time and place, is rather severely mutilated, having lost one of its ovigers and four legs. Its sex is indeterminable, but it is probably immature. The first segment of the trunk is distinct; the others can be traced, but with difficulty. The limbs are much more spinose than in my type; everywhere the tubercular enlargements from which the stiff setæ arise are more abundant, especially on the first coxa and the femur. The oviger also is very different. The first three joints are small, the third having an oblique termination which involves half its length; the fourth is as long as the two preceding, the fifth a trifle longer; the sixth is very short, and the seventh scarcely twice as long. Of the three terminals the middle one is the shortest, the other two being subequal in length. From the sixth each successive joint becomes more slender. The entire appendage is completely devoid of setæ, but on the inner margin of the seventh joint are three curved spines; on the eighth joint there are two, and on the terminal one there are six, one of them occupying the position of the terminal claw. An adult female was taken in 41 fms. (Jan. 30, 1903). The femora contain ripe ova and are swollen in consequence. The setæ are generally finer than those of the male. The oviger, too, resembles that of the male. The denticulate spines are fairly well preserved, and under a high power ($\frac{1}{6}$ " obj.) show a short shaft with three small, but strong, teeth. Then follows a flattened ovoid blade with a minutely toothed margin, the teeth of which are of a totally different character to those on the shaft. On the terminal joint these spines are more curved than elsewhere and the terminal claw does not exist, its place being taken by a much worn example of the denticulate spines. Another occurs more dorsally, but is broken off in this specimen.

I believe I am correct in identifying these specimens with the *P. cornigera* of Professor Möbius and with the *Cordylochele turqueti* of Professor Bouvier. Though I have seen both species, I must admit that I have not examined them with that care that the fact of a second closely allied species having been found demands.

The essential difference between the 'Discovery' and the 'Valdivia' specimens occurs in the length of the legs, which are half as long again in the latter specimens.

PSEUDOPALLENES AUSTRALIS.

(Plate I., fig. 2.)

Specific characters :—

Body with lateral processes widely separated, these and the cephalon armed with stout spurs.

Limbs armed with rows of prominent tubercles which bear the setæ. Propodus with few setæ dorsally and a proximal group of three or thereabouts.

Oviger ten-jointed, four terminal joints long and cylindrical. Denticulate spines without lateral teeth at base.

Body rather robust, though more slender than in the last-named species; lateral processes widely separated, and but little longer than the trunk is broad. It is smooth except for the spurs on the cephalon and lateral processes. These are similar to but more upright than those of *P. cornigera*. The segmentation is distinct.

The Ocular tubercle is short, stout, rounded at the extremity, and bears four large well-developed eyes. It rises just clear of the first pair of lateral processes.

The Abdomen is of normal proportions, rather ovoid in shape and without setæ. There is no articulation, and it is directed obliquely upwards.

The length of the body is 6mm. and its extreme width is 3mm.

The Proboscis and the Chelifori are as in the preceding species.

The Ovigera (fig. 2a) rise just behind the neck, each from a small body-process. The first joint is very small and stout, the second equally stout, but much longer; the third is more slender, and has the usual oblique termination, but is scarcely as long as the two preceding joints; the fourth is nearly as long as the three preceding. The fifth is much the longest of the appendage, slender and rather enlarged distally. The sixth is quite small, about a quarter the length of the fifth. All these joints bear a very few minute setæ, all of which have traces of an enlarged base. The four terminal joints are long and slender, with very little difference in their length; the first is longest, the next two are subequal, and the last the shortest. All are provided with numerous denticulate spines, which occur in a single row (fig. 2b). They comprise a rather conical shaft, surrounded by a flat leaf-like blade with a finely dentate margin. There is no trace of the stout basal teeth so characteristic of the preceding species. The end of the terminal joint bears two curved spines, which are obviously the same denticulate spines worn down. The character of these four terminal joints differs from those of the preceding species in their more slender and cylindrical form as well as their greater length.

The Legs extend to a length of 23mm. Of the three coxæ the second is quite as long as the other two together; the proportions of the three following joints are as 6:5.5:5.5; the tarsus is very small, the propodus is curved, especially proximally, and rather more than one-third the length of the second tibia. The terminal claw is very long and slender; there are no auxiliaries, nor is there any heel. The setæ, if such they may be called, are small and delicate. They lie in lines parallel to the surface of the joint, and, with very few exceptions, each one occurs on a prominent

tubercular process arched towards the extremity of the limb. They occur distally on the first coxa, dorsally on the second, where there are two rows, and ventrally on the third coxa. Elsewhere there are five rows in which the ventral tubercles are the smallest. Between the two rows on the second coxa distally is a rounded tubercle bearing no seta. The distal extremity of the second tibia is liberally provided with small stout setæ not connected with tubercles; its distal fringe is inconspicuous. The tarsus is covered with setæ which increase in length distally, forming a fringe of long and stout setæ. The tubercular character of the leg completely disappears on this and the succeeding joint. On the propodus there is a scanty supply of minute setæ dorsally, and ventrally at the proximal end of the joint is a well-developed enlargement bearing three spines of moderate strength; the rest of the ventral surface is occupied by a band of small but fairly prominent spinous setæ.

A single specimen of this species was taken off the Barrier, lat. $78^{\circ} 25' 40''$ S., long. $185^{\circ} 39' 6''$ E. in 300fms. Bottom, mud.

It is an adult female, with the Genital apertures prominent on the second coxæ of all the legs.

PALLENOPSIS.

Body slender or robust, distinctly segmented.

Proboscis cylindrical, ventral in origin, flexibly united to the trunk.

Abdomen long and slender.

Chelifori well developed; scape long, two-jointed.

Palps reduced to a more or less conspicuous knob.

Ovigers ten-jointed, present in both sexes, without a terminal claw or denticulate spines.

Legs with auxiliary claws. A tubular duct occurs in a mid-ventral position on the femora of the male.

Ocular tubercle placed anteriorly on the cephalon, with two unequal pairs of eyes.

As above stated, the generic definition is much altered from the original of Prof. E. B. Wilson (32). Besides the two new species described below, no less than thirteen have from time to time been recorded, all of them from a strictly limited number of specimens. They are separated by characters which, when committed to paper, do not appear as definite as one would like. Nothing is known with regard to the variation which may occur within the limits of "a species," and so it must remain open to question whether I have taken the right course with reference to *P. hiemalis* and *P. pilosa*, Hoek, or not.

PALLENOPSIS GLABRA.

Pallenopsis glabra, Möbius (23), p. 184.

Specific characters :—

Body comparatively slender, with lateral processes widely separated, and with two small tubercles dorsally.

Chelifori well developed, scape two-jointed, the whole limb minutely scabrous.

Palps reduced to a conspicuous stump.

Ovigers ten-jointed, without claw or denticulate spines.

Legs long, covered throughout with minute spinous setæ.

I am unable to find any satisfactory grounds for separating this species from that of Professor Möbius. A full description follows, as that of Professor Möbius is scarcely sufficient on small points. Body comparatively slender, with the lateral processes widely separated and slightly increasing in length to the third, which is directed backwards.

The Cephalon is long, rather broader than the rest of the body, bevelled anteriorly to form a median point, immediately behind which lies the stout ocular tubercle. This is stout, erect, rounded in front, and terminating in a short spine on the posterior half of the tubercle above the eyes. The four eyes are well developed, the anterior pair being much the larger. The Ovigera arise on small body-processes immediately in front, and rather below the level of the first lateral pair.

The Abdomen is very long, slightly curved, and with a clavate extremity; it is not articulated to the trunk, and is directed obliquely upwards at a considerable angle. It is covered with minute curved spines.

The segmentation of the trunk is rendered conspicuous by a slightly raised ridge forming the posterior border of the segment, these ridges are rather more prominent ventrally, and in both cases bear a few minute spines. Similar spines occur on the lateral processes, and form a distal fringe round them.

The Proboscis is movably articulated to the trunk and directed downwards, its origin is ventral, and at the proximal end of the cephalon; it is cylindrical, tapering slightly, its distal extremity rounded and the mouth small. It is completely covered with minute spines except for a narrow band in the mid-ventral line.

The Cheliferi are well developed, and arise close to the middle line, their origin occupying almost the entire width of the cephalon. The scape is two-jointed, and half as long as the trunk measured to the base of the abdomen; the two joints are sub-equal in length, the second being expanded distally. The chela is directed downwards, the palm rather curved, and fully as long as the other joints. The small dactyli are directed inwards, the movable one having a spinous cushion at the base. The entire appendage is covered with minute spines, largest and most numerous on the second joint of the scape, the distal fringe of which is also more conspicuous.

The Palps are stout single-jointed stumps arising from the sides of the cephalon, about the middle of its length.

The Oviger is ten-jointed. The first joint is very short and stout, the second is much longer, clavate and setose on its outer margin; the third is shorter, curved, and having a very oblique termination; it is also setose on its outer margin. These three joints form a curve in one direction, and the following three curve in another. The fourth and fifth joints are comparatively long and sub-equal, both slightly curved, the fourth setose on both sides, the fifth only on its outer margin; the sixth joint is short and much curved, and from this one the remaining joints become shorter, more slender, and more setose, the setae being longer than elsewhere. There is no terminal claw, nor denticulate spines.

The Legs are long, attaining a length of 69mm. The lateral line is conspicuous, beginning on the lateral processes and extending to the end of the second tibia. Of the three coxæ the second is longer than the other two together, all three are thickly covered with small spinous setæ on the ventral surface, but, except on the first coxa, there are none dorsally. The proportions of the three following joints are as 17 : 14·5 : 21. The femur is fairly well covered with minute setæ ventrally; dorsally they are much less numerous, except at the distal extremity. A linear arrangement of the setæ is observable, but it is not very regular, a distal fringe is not very prominent, and almost confined to the dorsal side. On the first tibia the setæ become more numerous dorsally, they preserve the same general arrangement, but there are longer setæ mixed with them. On the second tibia this becomes much more pronounced, and ventrally the setæ are so numerous that the linear arrangement is completely obscured; the distal fringe on both joints is well developed, more especially so on the ventral side of the second tibia. The tarsus is very small, the ventral surface being double that of the dorsal; the former is covered with long spinous setæ, most prominent distally, like those of the distal fringe of the preceding joint, dorsally they are smaller, but form a well-developed fringe. The propodus is slightly curved, and completely covered with small spinous setæ, and some of these form a distal fringe over the insertion of the terminal claw and its auxiliaries. At the proximal end of the joint is a series of some half-dozen short spines, the centre ones being the largest; beyond these a group of stout spinous setæ extends to the end of the joint. The terminal claw is short, half the length of the propodus, and the auxiliaries are about half its size.

Of the two specimens obtained one is a male, and the Genital apertures occur on a slight swelling at the distal extremity of the second coxæ of the two posterior pairs of legs. On the ventral surface of the femur is a swelling about the middle of its length, and this bears a short but stout duct characteristic of the males of this genus. The Genital apertures of the female occur on a very pronounced swelling, in a similar position to those of the male, but on all the legs.

This specimen is remarkable for having the first leg of the right side complete in all essential details, but not extending beyond the distal extremity of the femur of the normal limb.

Winter Quarters, off Flagon Point. January 17th, 1903. 5-20 fm. Very rough ground.

PALLENOPSIS VILLOSA.

(Plate II., fig. 1.)

Body robust, with lateral processes rather close together. Entire animal clothed with long, slender setæ, giving it a woolly appearance.

Chelifori well developed, scape two-jointed, no setous cushion at the base of the dactylus.

Palps reduced to a knob.

Oviger ten-jointed, without claw or denticulate spines.

Legs densely clothed with fine setæ, propodus with several strong spines ventrally; one or two of the proximal ones are much the largest.

Body robust, with the lateral processes distinctly, but not widely separated. Segmentation is complete, and in the case of the trunk it is rendered very prominent by each segment to some extent overlapping the following one; this is most noticeable ventrally.

The Cephalon is large, with a distinctly constricted neck. At its extreme anterior end, which is straight, the stout rod-like ocular tubercle projects slightly forwards; this is rounded at its extremity, where there are four well-developed eyes, the anterior pair very much larger than the posterior.

The Abdomen is long and distinctly articulated to the trunk; it increases in diameter to a short distance from its extremity, when it abruptly tapers to a blunt point. About its middle it is provided with a considerable number of long slender setæ. Similar setæ fringe the anterior border of the cephalon, the distal extremities of the lateral processes, and the posterior border of each segment. None of these setæ are present ventrally. The length of the body is 10mm., and its width is 6.5mm. The abdomen measures barely 4mm.

The Proboscis is stout, cylindrical, rounded at the extremity, and articulated to the trunk on the ventral surface, and therefore directed downwards. The mouth is small. It is liberally covered with short setæ. In length it is scarcely half that of the body.

The Chelifori are long and chelate; they arise quite close to the middle line underneath the anterior border of the cephalon. The scape is stout and two-jointed, measuring some 5mm. in length; the two joints are sub-equal and covered with long slender setæ, the second joint more abundantly so, especially distally. These setæ are confined to the dorsal surface; a row exists ventro-laterally, but ventrally they are replaced by very short setæ. The third joint, forming the chela, is directed downwards, and is shorter than the preceding. It is covered all over with setæ, shorter than the average, but varying in length from the proximal to the distal end; on the outside of the movable finger is a dense tuft of long setæ (fig. 1a). The dactyli are turned inwards, the movable one being the longer. They are curved at the tips, which cross over each other, and are devoid of teeth.

The Palps arise at the side of the proboscis, and are nothing more than rounded knobs.

The Ovigera are ten-jointed, and without terminal claw or denticulate spines (fig. 1b). They arise ventro-laterally between the base of the proboscis and the first lateral processes. All the joints are small, and the appendage is curved like an attenuated **S**, and setose throughout. The first joint is small and stout, the remainder gradually decrease in breadth; the second is about twice as long as the first; the third is intermediate between the two, and has a very oblique termination. These three joints bear long setæ on the outside of the curve formed by them. The fourth joint is the longest on the appendage, and slightly curved; it bears a few long setæ on the inner side, and numerous short ones on both. The fifth joint is not so long, also slightly curved and dilated distally with long setæ on its outer side. The sixth joint is shorter and slightly curved; it is thickly clothed with long setæ, and bears a few

on the opposite side distally. The seventh, eighth, and tenth joints are sub-equal in length, and the ninth is a little shorter. The arrangement of the setæ is the same as on the sixth joint, except that the distal group on the outer side increases on each joint, so as to involve the whole of it. The setæ on the five terminal joints are very long and quite simple.

The Legs are very stout, and some 36mm. in length. The first coxæ are about as long as their corresponding lateral processes; the second are longer, and, in the female, bear a conspicuous enlargement ventrally near the distal extremity, upon which the large genital openings occur; these are on all the limbs. The third coxæ are about the same size as the first. The three following joints differ but little in size, being proportionally as 8.5 : 9 : 9.5. The tarsus is very small, and the propodus is about a quarter the length of the second tibia. The entire limb is clothed with setæ. Dorsally the three coxæ each bear a prominent distal fringe of long setæ. The first has two lateral bands in addition, while the other two are more completely clothed. Ventrally the third coxa is partially covered with small setæ, and has a prominent distal fringe of longer ones, the other two only possess a distal fringe of short setæ. On the femur the dorsal surface is covered with long setæ, which also form a prominent distal fringe; the ventral surface bears only small setæ, but on each side there is a band of the large ones just below the well-developed lateral line. This arrangement holds good on the two tibiæ, but the setæ are much more thickly set. At the distal extremity of the second tibia the setæ become spinous ventrally, and as spines form the distal fringe on that side. The ventral surface of the tarsus is clothed with spines which are large distally; dorsally there is a fringe of setæ only. The propodus is covered dorsally with setæ of more moderate length than those on the appendage generally; laterally they are smaller still, and along the ventral aspect there is a row of about a dozen strong spines, a little irregular in size, but one or two of the proximal ones are much the largest. There is no projection of the propodus beyond the insertion of the terminal claw, which is stout and rather more than half the length of the joint that bears it. It is accompanied by two small auxiliaries.

The single specimen is an adult female, and contains ripe ova.

Taken off Coulman Island in 100 fm., on mud and stones, January 13th, 1902.

PALLENOPSIS PILOSA.

(Plate II., fig. 2.)

Phoxichilidium pilosum, Hoek (14), p. 90.

Pallenopsis pilosa, Hoek (16), p. 9.

Specific characters :—

Body not very robust, with lateral processes not widely but distinctly separated. Body (dorsally) and legs covered with extremely long thin hairs.

Chelifori well developed, scape showing distinct articulation on the dorsal surface. No setose pad at base of dactylus.

Body fairly robust, with lateral processes distinctly, but not widely, separated; two pairs directed forwards and the other two backwards.

Cephalon stout, longer than two segments of the trunk, cylindrical, with its anterior border bevelled on each side; near the point thus produced lies the Ocular tubercle. This is short and stout, capped by a blunt point below which are four well-developed eyes; the anterior pair larger than the posterior pair.

The Abdomen is long and slender, terminating in a blunt point, and bearing numerous long setæ.

The segmentation of the body is perfect, and on the posterior margin of the three anterior segments are two tufts of long slender setæ, a number of which occur also on the lateral processes, and also form the distal fringe. The ventral surface is devoid of setæ.

The length of the body is 10mm., its width 5mm. The abdomen measures 4mm. in length.

The Proboscis is ventral in position, directed downwards and movably articulated to the trunk. It is cylindrical, terminating in a blunt cone; mouth small, covered with small setæ 4mm. long.

The Chelifori are well developed; they arise close to the middle line in front of the cephalon, and extend considerably beyond the proboscis. The scape is long and single-jointed, though dorsally there is a slight enlargement about the middle of its length, indicating a possibly fused joint. Numerous long and slender setæ are distributed over the scape. Distally the setæ are smaller, and there is a strongly developed distal fringe. The chelæ are comparatively small, and hang vertically. The palm is scarcely more than a quarter the length of the scape, covered with short stiff setæ. The fingers are small, and directed inwards at a considerable angle from the palms; the movable finger is nearly twice the size of the other, but neither bears any trace of teeth.

The Palps are quite rudimentary, being nothing more than a small but conspicuous rounded stump at the side of the proboscis, well behind the ocular tubercle when viewed from the dorsal aspect. They bear a few small setæ.

The Ovigera occupy a lateral position immediately in front of a shallow groove separating the cephalon from the first lateral processes. They are ten-jointed (fig. 2). The first joint is small and stout; the second is about three times as long, enlarged distally; the third is intermediate in length between these two; the fourth is long, about as long as the two preceding joints, and very stout; the fifth is very little longer, slightly narrowed in the centre, and expanded distally; the sixth is stout, and not half the length of the fifth. All these joints bear a few short setæ, most numerous on the outer side of the fifth and sixth joints. The seventh joint is longer than the sixth or the two following together; of these the proximal is shorter, the terminal joint (missing in the appendage examined in detail) is quite small and without a terminal claw. The last four joints bear long and stout setæ of a simple character. There are no denticulate spines.

The Leg attains a length of 32mm. Of the three coxæ the second is about as long as the other two together, and is much enlarged distally. The first bears a mid-dorsal row of a few long setæ and a distal fringe of the same kind. The second bears two dorso-lateral rows and the distal fringe; and ventrally, a conspicuous fringe between the distal extremity and the genital apertures. The third coxa is covered ventrally and laterally with setæ and carries ventrally a very prominent distal fringe. The proportions of the three following joints are 8·5 : 8·5 : 10, these joints are covered with lines of very long slender setæ, their great length making it difficult to determine the precise number of rows. On the femur they are most abundant ventrally, except near the distal extremity. On the two tibiæ the ventral surface is much more scantily supplied. The distal fringe of the second tibia is rather spinous ventrally. The tarsus is very small, setose, and with a few spinous setæ at its ventral extremity. The propodus is curved, covered with rather short setæ, a fringe of longer ones distally; there is no heel. Ventrally at the proximal end of the joint are two or three stout spines, and a band of smaller ones of irregular size extends to the end of the joint. The terminal claw is long and slender, with two well-developed but not large auxiliaries. Small setæ also occur more or less abundantly throughout the limb.

The Genital apertures of the female occur on the enlarged part of the second coxa of every leg. In the male these orifices occur at the apex of a pointed tubercle on the two posterior legs only. The male as a rule is more setose than the female, and on the mid-ventral surface of the femur there is the duct so characteristic of the males of this genus; in this species it is long and slightly twisted, conspicuous even among the long setæ. The joints of the ovigers up to the sixth joint are more strongly developed, longer, and all are more setose than those of the female. One specimen has three perfect ovigers, two on one side being in contact with one another. The eggs are rather large, and held round each oviger in a single rounded mass.

Several specimens of this species were taken off the Ice Barrier in the Ross Sea, 300fm., mud bottom. I am unable to find any satisfactory reason for separating them from the species of Dr. P. P. C. Hoek. They are smaller, and the only character which can be used to separate them is the comparative length of the four terminal joints of the oviger, but this does not seem to me to be sufficient.

PALLENOPSIS HIEMALIS.

(Plate I., fig. 4; Plate II., fig. 3.)

Body well built, with lateral processes widely separated, but of variable length, and having a tubercular swelling at the dorsal extremity.

Chelifori and abdomen both proportionally long.

Palps, a rather long stump.

Legs clothed with short, stiff setæ.

Body well built, with the lateral processes rather widely separated, as long as the trunk is broad, and each bearing distally a stout tubercle of no great elevation.

The Cephalon is elongated, but not much enlarged in diameter, with a very slightly constricted neck between the first pair of lateral processes and the small body-processes from which the ovigers arise, and which are plainly visible dorsally. The anterior margin of the cephalon is angular, and the Ocular tubercle arises at its front. This is stout, directed very slightly forwards, and terminates in a point above the four well-developed eyes; the anterior pair are larger than the posterior.

The Abdomen is long, not articulated to the trunk, and slightly enlarged before it terminates in a blunt point; it is directed upwards to a moderate extent. The length of the body is 11mm., its width 4.75mm., and the length of the abdomen is 3.75mm. A few small, stiff setæ occur dorsally at the posterior margin of the segments and at the extremity of the lateral processes.

The Proboscis is stout, cylindrical, rounded at the extremity; the mouth is small. Ventrally it measures 4mm. in length and, except in the mid-ventral line, it is closely covered with small, stiff setæ. It is ventral in position, directed obliquely downwards, and articulated to the trunk.

The Chelifori are well developed, and arise close together above and in front of the proboscis. The scape is long and stout, projecting beyond the extremity of the proboscis, though only 4mm. long. It is divided by a distinct joint into two sub-equal portions and covered completely with short, stiff setæ; the second joint is expanded distally and has an oblique termination. The chela is well developed, the palm being rather shorter than the joints of the scape, but like them densely setose. The dactyli are set on its inner extremity and lie transversely. They are short and stout, smooth without teeth; the movable one is the larger, and has a setose pad at the base.

The Palps are stout, single-jointed, rather long stumps; they arise from the sides of the cephalon about the middle of its length.

The Ovigers are ten-jointed, without terminal claw or denticulate spines (fig. 4a). The appendage arises on a small process of the body in front of the first lateral process. The first joint is short and very stout; the second is at least twice as long, slender proximally, much dilated distally; the third is shorter, and the oblique articulation of this joint with the next renders the fourth to all intents and purposes lateral; the fourth is the longest of the appendage and stout; the fifth shorter, and the sixth shorter still. The limb is curved in the form of an **S**, the first three joints forming the curve in one direction, the three following curve in another. Of the four terminal joints the seventh is short, the eighth is longer, the ninth and tenth progressively shorten. The entire appendage is setose, the setæ are small and rather sparse proximally, becoming more numerous to the fifth joint; from that joint onward they are longer, but quite simple, and more completely clothe the joints.

The Legs extend to about 38mm. Of the three coxæ the second is fully twice as long as the other two together, and bears a low rounded tubercle dorsally, just beyond the middle of its length. The first coxa carries dorsally a stout but short tubercular process, similar to, but smaller than, that of the lateral process. The proportions of

the three following joints are 9:8.5:11.5. The tarsus is very small, and of the normal shape. The propodus is one-third the length of the femur, very slightly curved. At the ventral side of the extremity is a stout claw, with two well-developed auxiliaries; the heel does not project beyond the insertion of these claws. The joint is uniformly clothed with short spinous setæ, and there is dorsally a projecting fringe. Ventrally there is a row of stout spines, of which some half-dozen, not very regular in their position, are very prominent (fig. 3). The entire limb is uniformly and densely clothed with very short, stiff setæ, and these, as is usually the case, are more numerous and longer on the second tibia; the distal fringe on this latter joint is prominent, with at least one stout spine ventrally. The ventral setæ on the tarsus are also spinous, one being particularly large. The lateral line is very prominent from the lateral processes to the tarsus, both inclusive.

The specimen is a female and bears Genital apertures on a swelling of the second coxa of every leg.

Winter Quarters, inside the 20-fm. line.

A specimen was taken off Cape Wadworth, Coulman Island, which, notwithstanding certain important differences, I cannot regard as being specifically distinct. It is a male, and rather larger than the type. The obvious differences lie in the much greater length of the lateral processes and the character of the ventral spines on the propodus (fig. 3a). With regard to the first of these features, the third lateral process of the right side is but little more than half the length of the others; the first coxa, the only joint of that appendage that exists, is also abnormally small, though there are no definite traces of injury. The other feature rests on the armature of the propodus. The ventral surface of this joint bears proximally three very stout spines, and from there to the extremity is a band of spinous setæ.

The length of the body is 12mm., of the trunk only 9mm., and its extreme width is 6mm., rather larger, especially in the last measurement, than the type. The chelifori (scape) and the abdomen are a little shorter. The oviger differs only in being much stronger; the setæ are more numerous and also stronger. The fifth joint is however longer, nearly equalling the fourth. This is a not uncommon sexual difference. The lateral processes and the first coxa exhibit in a less degree the tubercular processes of the type.

The proportions of the three principal joints of the legs are 9.75:8.5, and 12, a difference of no importance. These limbs are setose throughout; though the setæ are rather deficient proximally, becoming much more abundant on the tibia. Ventrally they are very small, stiff, and crowded; dorsally much less numerous. They have among them a number of much longer and more slender setæ. The tarsus is coarsely setose ventrally, with one very prominent spine. The distal fringes of the joints are not strongly developed; that of the second tibia is chiefly ventral and spinous. The lateral line is very distinct from the lateral process to the end of the second tibia. The femur is swollen ventrally near the middle, and bears a very short but stout tubular duct.

Another specimen, a male, was taken in Winter Quarters, inside the 20-fm. line, before the ship was frozen in. It is in a severely mutilated condition, having lost the posterior segment of the trunk and several legs. It differs slightly from the male above described, the lateral processes being a little closer together and the body, especially the cephalic portion, being a trifle stouter, and the tubercular knobs on the lateral processes not being so distinct, but all these features can, I think, be readily accounted for by age.

This species is closely allied to *P. patagonica*, Hoek.

NYMPHON.

This genus is perhaps the most widely distributed and best known of all the genera of Pycnogonida. It is readily distinguished from all others by the well-developed chelifori, the five-jointed palps, and the ten-jointed ovigers, the four terminal joints of these being provided with a single row of denticulate spines. The form of the body varies greatly within certain limits, and Professor Sars (25) has subdivided the genus into three:—

Nymphon retains the more slender and comparatively long-legged species.

Chætonymphon the more robust and short-legged species, which also, as a rule, are more setose on the body than those of the original genus, *Nymphon*.

Boreonymphon, another robust form, readily separable from the others by the absence of teeth on the chelæ, the spines of the ovigers being simple and not denticulate.

The species brought back by the 'Discovery' are eight in number; four are assigned to the original genus, though one of these, *N. adarecanum*, bears a few simple spines on the oviger instead of the rows of denticulate spines. The other four, of which one, for the present at least, is regarded as a southern variety of a previously described species, are assigned to the genus *Chætonymphon*.

NYMPHON HIEMALE.

(Plate III., fig. 1; Plate X., fig. 8.)

Specific characters:—

Body slender, with rather long lateral processes very widely separated. Limbs covered with very minute setæ.

Ocular tubercle stout and short.

Palps five-jointed, proportions of last three as 7 : 4 : 5·5.

Oviger ten-jointed, denticulate spines rather numerous, with eight to ten teeth on each side.

Legs long, scabrous, terminal claw with well-developed auxiliaries.

Body smooth, slender, with rather long lateral processes, which are very widely separated; the first of these is curved forwards. The segments are very strongly marked immediately behind the lateral processes.

The Cephalon is long, the greater part of its length is taken up by a slender

neck; anteriorly it is much expanded, the two lobes being separated by a small but conspicuous groove.

The Ocular tubercle is situated immediately in front of the first lateral processes; it is comparatively stout, short, truncate, and bears four well-developed eyes without any pigment.

The Abdomen is small, ovoid, does not project beyond the last pair of lateral processes, and is not articulated to the trunk. The length of the body is 7.5mm. and its width is almost 4mm.

The Proboscis is cylindrical, smooth, and directed obliquely downwards; it is about 3mm. in length.

The Chelifori are well developed. The scape is as long as the proboscis, slightly curved and sparsely covered with minute setæ; the distal fringe is not conspicuous. The chelæ are also curved, half their length being taken up by the palm, which is finely setose, the setæ extending on to the base of the immovable finger. The fingers are slender, much incurved at the tip. The teeth are numerous and regular in size, not so closely set in the immovable finger as in the other.

The Palp is slender, five-jointed, and rises at the side of the proboscis below the chelifori (fig. 1a). The first joint, as usual, is very small; the second is the longest of the appendage, slightly swollen distally, and sparingly covered with minute setæ. The third joint is but a little shorter, rather stouter, and more liberally supplied with short setæ, though these are still scanty. The fourth joint is scarcely half as long as the second, very richly supplied with short setæ on its ventral margin, much more sparingly dorsally. These three joints have a well-defined distal fringe. The terminal joint is nearly half as long again as the preceding and, like it, richly clothed with short setæ ventrally, more sparingly dorsally.

The Oviger is ten-jointed, and arises ventro-laterally in front of the first lateral process on a prominent body-process, the position of which is clearly seen from the dorsal surface (fig. 1b). The first three joints are small and stout, the third curved and having a very oblique termination; only a distal fringe of very small setæ can be detected on these joints. The fourth joint is very long, slightly curved, with very few minute setæ besides the distal fringe. The fifth joint is much the longest of the appendage, and is thinly covered with very small setæ, with a more strongly marked distal fringe. The sixth joint is little more than half as long as the preceding, slightly curved, and thickly clothed with small stiff setæ on its outer side and a well-developed distal fringe. The four terminal joints are long, progressively decreasing in length, but the last two are sub-equal. All are more or less well supplied with short stiff setæ dorsally and a distal fringe of rather longer setæ. The terminal claw is long and slender, with about fourteen curved teeth. The denticulate spines are long, and in the specimen critically examined occur 13 : 10 : 10 : 9 on the various joints. (Plate X., fig. 8.) The shaft is flattened and slender, and carries eight to ten teeth on each side; the third or fourth

from the base is the largest, the remainder tapering off to very minute proportions. The eggs are small and the spherical mass is packed round the proximal part of the fifth joint.

The Legs are long and slender and attain a length of about 45mm. The second leg of the right side has in this case been selected for measurement. Of the coxæ the first and third are sub-equal, the second being quite as long as the other two together. The proportions of the three following joints are as 10 : 11 : 16, and the tarsus and propodus taken together are 4·5, the former joint being a little the longer of the two. A lateral line is plainly visible on the femur and to the end of the leg. On the femur such setæ as exist are extremely minute; on the second tibia they are very numerous but small, arranged principally dorsally and ventrally, with a distinct distal fringe. On the tarsus and propodus the arrangement is the same, but the setæ are even more crowded. Ventrally on the propodus is a row of about a dozen comparatively strong spines, more distally than proximally. There is a distinct heel fringed with rather long setæ. The terminal claw is stout and accompanied by two auxiliaries about one-third its size.

The Genital apertures of the male are found on the second coxæ of the two posterior legs, those of the female being found on all the legs.

A number of specimens were taken in Winter Quarters in 125 fm.

NYPHON LANARE.

(Plate III., fig. 2; Plate X., fig. 9.)

Specific characters :—

Body very slender, with lateral processes long and widely separated.

Ocular tubercle short and stout.

Palps five-jointed, proportions of last three 10 : 9 : 11.

Oviger ten-jointed, denticulate spines, about double the number on the first joint as on any of the others, with five to seven teeth on each side.

Legs long and slender, with long and fine setæ, terminal claw long, without auxiliaries.

Body very slender, with lateral processes long and very widely separated.

The Cephalon is long, expanded anteriorly into two lobes separated by a narrow groove. The neck is elongated, and at its base, ventrally, are small body-processes for the attachment of the ovigers, visible from the dorsal aspect.

The Ocular tubercle is short, stout, and truncated; it lies immediately in front, but not quite clear of the first pair of lateral processes. It bears four well-developed eyes.

The Abdomen is quite small, and does not extend as far as the posterior lateral processes. It is directed slightly upwards, and not articulated to the trunk. The length of the body is 8·5mm., and its width 5mm.

The Proboscis is cylindrical, slightly swollen in the middle, its extremity being rather angular. Together with the body, it is quite devoid of setæ.

The Chelifori are well developed, long and slender. The scape is single-jointed, longer than the proboscis, but scarcely as long as the chela. It bears but few setæ,

except a distal fringe of long and slender ones. The palm of the chela occupies about half its length, and bears a number of fine setæ dorsally. The fingers are long, slender, incurved at the tips, and provided with numerous slender teeth, irregular in size and not very closely set.

The Palp arises laterally at the side of the proboscis (fig. 2a), and comprises the normal five joints, all of which, except the first, are very long and slender, the proportions being 10 : 10 : 9 : 11. Setæ are non-existent on the first two joints; on the third scanty, most numerous on the terminal joint, but not very thickly distributed there; they are small, rather delicate, and occur mainly on the outer side of the limb.

The Oviger has the normal ten joints, and arises on a small ventro-lateral body-process just in front of the first pair of lateral processes (fig. 2b). The first three joints are small, but progressively lengthen, the third having the usual oblique termination. The fourth joint is long, the fifth longer, and the sixth still long, though the shortest of these three, the proportions being about 7 : 8 : 5. The sixth joint is rather thinly covered with small setæ on its outer side, and has a well-developed distal fringe. The preceding joints have so few minute setæ between them that they are scarcely noticeable. Of the four terminal joints, the first is about twice the length of the next; the other three differ very little in size, but the middle one is the smallest. All are provided with a few small setæ and distal fringes. The terminal claw bears a dozen slender teeth rather closely set. The denticulate spines form a single row (plate X., fig. 9). They consist of a stout shaft, which begins to taper at about a quarter of its length, where the denticulations begin. Of these there are from five to seven; the first is small, the next three large, and the remainder more or less vestigial. Of these spines there are 10 : 5 : 4 : 5 respectively on the various joints.

The Legs are long and slender, attaining a length of nearly 45mm. The three coxæ are long, the second being longer than the other two together; these joints are rather scantily clothed with setæ of no great length. The proportions of the following joints are 8·5 : 9·5 : 12 : 4 : 3. The terminal claw is very long and slender, more than half the length of the propodus, and there are no auxiliaries. The limb is clothed with setæ, not very closely set, in a linear manner. On the femur and tibia they are very long and slender, becoming reduced in size on the tarsus, while on the propodus they are very small.

Two examples of this species were taken off the Barrier in 300fm., bottom mud, 27th January, 1902.

NYMPHON ADAREANUM.

(Plate III., fig. 3.)

Specific characters :—

Body smooth and slender, with lateral processes widely separated.

Ocular tubercle short, rounded.

Palps five-jointed, proportions of last three 2·5 : 1·25 : 1·75.

Oviger ten-jointed, without denticulate spines, but with very few simple curved spines.

Legs of moderate length, with rather long setæ, terminal claw with two well-developed auxiliaries.

This small species has a fairly well-built body, with the lateral processes rather widely separated, and as long as the diameter of the trunk. The trunk articulations are very distinct, and immediately behind the lateral processes. No setæ of any kind are to be seen on the body.

The Cephalon is stout but not widely expanded, showing two distinct lobes for the reception of the chelifori; it is not quite as long as the second and third trunk segments together.

The Ocular tubercle is very stout, of small elevation, rounded at the summit, and carries four well-developed eyes. It lies just in front of the first pair of lateral processes and behind the neck.

The Abdomen is of moderate dimensions, curved upwards, and not separated by an articulation from the trunk.

The length of the body is 2.75mm., and its extreme width 1.5mm.

The Proboscis arises on the ventral side of the trunk, and measured ventrally it is nearly one-third the length of the entire body. It is stout, gently tapering to a rounded extremity, quite smooth.

The Chelifori are well developed; the scape is single-jointed, extending beyond the proboscis; provided laterally with comparatively long setæ. The chela is not very long, the palm and fingers occupying approximately equal halves; the former is covered with setæ, and the fingers, rather curved, are supplied with a very moderate number of slender teeth rather widely separated.

The Palp is five-jointed, and rises underneath the chelifori (fig. 3a); as usual, the first joint is very small and the second long. Owing to distortion in mounting this appendage, the comparative length of the second and third joints cannot be very accurately stated, but the second appears to be twice the length of the third; the fourth is half the length of the third, and the fifth is longer than the preceding, the proportions being 5 : 2.5 : 1.25 : 1.75. The terminal joint is ovoid, and fairly well supplied with comparatively long setæ; the three preceding joints have well-developed distal fringes and a small number of setæ scattered along the shaft; these are most numerous on the third joint.

The Oviger is ten-jointed, and rises from a small process of the trunk, visible dorsally, just in front of the first pair of lateral processes (fig. 3b). The first three joints are very small; the second and third are subequal in length, the latter much the more slender; the fourth is longer than the three preceding ones together; the fifth is twice as long, much curved, and bears a few setæ on its outer margin; the sixth is half as long as the fourth. The four terminal joints are very small, the first being the largest, and all bear two or three long setæ distally. The terminal claw is long and slender, with five slender teeth set at irregular intervals. Of denticulate spines, such as characterise the genus *Nymphon*, there are none, but of special spines there are 2 : 2 : 2 : 1 on the four joints; these are curved blades without any other distinguishing feature.

The Legs are not very long, extending to nearly 11mm. from the trunk. Of the three coxæ, the second is as long as the other two together, the first being by a little the smallest; the proportions of the remaining joints being 4 : 5 : 6 : 0·75 : 2. The terminal claw is large and stout, with two well-developed auxiliaries. The lateral line is distinct throughout. The setæ have a rather indistinct linear arrangement, those on the sides of the coxæ are prominent, especially on the second; on the third they are more confined to the ventral surface, and the distal fringe is fairly well developed. On the femur the setæ are long and straggling, chiefly lateral, and ventrally there is a row of small tubercles. On the two tibiæ, but more especially the second, the setæ are most abundant, largest on the first. Ventrally they are much smaller, the distal fringe of the second tibia becoming spinous. The tarsus is a very short joint with long setæ dorsally, smaller and more numerous ones ventrally, which become delicate spines distally. The propodus is covered with setæ dorsally, and ventrally there is a row of rather strong spines, and of these the middle ones are strongest.

The single specimen is a male, carrying young, apparently just hatched. The Genital apertures are to be found on the second coxæ of the two posterior pairs of legs.

From the root of a Laminarian taken in 17 fm., Cape Adare, 24th February, 1904.

NYMPHON FRIGIDUM.

(Plate III., fig. 4; Plate X., fig. 10.)

Specific characters:—

Body very slender, with lateral processes long and very widely separated.

Ocular tubercle very short, stout.

Palps five-jointed, proportions of last three 3 : 1·5 : 3.

Oviger ten-jointed, denticulate spines not very numerous, with five to seven lateral teeth.

Legs long and slender, propodus with ventral row of spines, a large terminal claw and two auxiliaries.

Body well built, perfectly smooth, with the lateral processes widely separated and rather long, much more slender than the trunk.

The Cephalon is rather long, with a distinct neck and expanded anteriorly into the two normal lobes.

The Abdomen is short, directed obliquely upwards, and not projecting beyond the posterior pair of lateral processes.

The Ocular tubercle is stout, very short, and bears four well-developed eyes.

The length of the body is 2mm., and its extreme width is 1·2mm.

The Proboscis is cylindrical, directed downwards.

The Chelifori comprise a single-jointed scape, slender, and covered with a small number of fine setæ. The chelæ are well developed, the palms being about half their length, and setose; the fingers are not much curved, provided with a number of teeth, not very closely set, and of uniform size.

The Palp is five-jointed and rises underneath the chelifori (fig. 4a). The first

joint is small, and the proportions of the remainder are 4 : 3 : 1.5 : 3. The terminal joint is well supplied with setæ on the outer side, and the preceding one is similarly, but less well, provided. Elsewhere they are scanty, a few on the third, and only an occasional one on the second.

The Ovipositor is ten-jointed, and rises from a small process immediately in front of the first pair of lateral processes (fig. 4b.) The first joint is very small, the two following are longer and subequal, the third having as usual a very oblique termination. The fourth and fifth joints are subequal, and each much longer than the first three together; the sixth is half as long as the preceding. Of the four terminal joints the first is the longest, the rest differ but little, but the last is longer than the others, and bears a terminal claw with some half-dozen teeth. A limited number of setæ occur on all the joints from the end of the fourth. The denticulate spines are not very numerous, 8 : 5 : 4 : 5, and consist of a slender tapering shaft with from five to seven lateral teeth; the second from the base is strongly developed, the rest graduated to nothing (plate X., fig. 10).

The Legs are long and very slender; they are about 9mm. long. Of the three coxæ the second is longer than the other two together, the proportions of the remaining joints being 4 : 4.5 : 7 : 1 : 1.5. The terminal claw is more than half as long as the propodus, and is accompanied by two slender auxiliaries. The entire limb is rather thinly clad with setæ, which, as usual, are most abundant on the second tibia. The propodus bears ventrally a row of comparatively strong spines, not very regular, the middle ones being generally best developed.

This is not a mature form, and the sexual apertures cannot be distinguished. I am unable to identify it with *Nymphon hiemale*, though it occurs in the same locality, and feel compelled to regard it as an independent species.

CHÆTONYMPHON VILLOSUM.

(Plate IV., fig. 1; Plate X., fig. 11.)

Specific characters :—

Body robust and with the appendages covered with long and fine setæ; lateral processes close together.

Ocular tubercle rather tall, with four eyes at summit.

Palp five-jointed, proportion of last three 6 : 2 : 3.

Ovipositor ten-jointed, denticulate spines not numerous, having five to seven lateral teeth on each side.

Legs short, with a strong terminal claw and two well-developed auxiliaries.

Body very robust and, with the appendages, covered with long and fine setæ. The lateral processes are close together, and these, being stout, give the body a compact ovoid form.

The Cephalon is short, much expanded, and the neck, which thereby becomes distinct, is scarcely a real constriction, the expanded portion being divided into two distinct lobes, bearing a few long setæ distally. Similar setæ occur dorsally on

each segment of the trunk and on the lateral processes, in addition to the distal fringe. There are none ventrally.

The Ocular tubercle rises from the neck immediately in front of the first pair of lateral processes; it is moderately tall, cylindrical, and bears at its rounded summit four well-developed eyes.

The Abdomen is long and slightly ovate; it projects beyond the first coxæ of the posterior pair of legs in their normal position, and bears a few small setæ.

The length of the body is 6.5mm. and its width is scarcely 4mm.

The Proboscis is stout, cylindrical, and inclined downwards; it is quite devoid of setæ of any kind, and 2.5mm. long, measured dorsally.

The Chelifori are strongly developed; the scape is stout and single-jointed; it bears on its inner margin a band of long setæ and a distal fringe of similar setæ, but these are much reduced in size on the outer side. The chela is strong, the palm is setose all over and well on to the base of the immovable finger. These setæ are of normal size. The fingers are inclined at a considerable angle with the palm, and are curved at the tips, especially the immovable one. Both are provided with numerous slender teeth, not very closely set, and variable in size; these teeth may be said to be large and small, but they are not disposed with any regularity.

The Palp has the normal five joints and arises at the side of the proboscis (fig. 1a). The first joint is very short and stout; the second is the longest; this is stout, dilated, curved at its distal extremity, sparsely covered with long setæ and much more abundantly with fine ones. The third joint is nearly as long, as 8 to 10, and more abundantly supplied with both kinds of setæ, which occur throughout the appendage. The fourth joint is short and richly setose; the fifth is about half as long again as the fourth, and also richly setose.

The Ovigera arise ventro-laterally, immediately in front of the first pair of lateral processes (fig. 1b). Of the orthodox ten joints the first three are quite small, the last being slightly curved, longer than either of the other two, and with an oblique termination. The fourth joint is long, the fifth is longer still, the sixth about half the length of the preceding. All these joints are covered with very fine setæ; on the first four there is an occasional longer and coarser seta, and on the fifth joint these are more conspicuous on the outer margin and distal extremity; on the sixth joint they cover it on the outer side and form a well-developed distal fringe. Of the four terminal joints the first three progressively shorten without any conspicuous difference in size; the terminal one is a little longer than the preceding, and bears a slender curved and dentate claw half as long again; there are eleven slender teeth on the claw. The denticulate spines are not numerous on these joints, 5:4:3:4, and are of the normal type, the shaft bearing five to seven lateral teeth. The spines on the proximal joint are the largest. (Plate X., fig. 11.)

The Legs are short and robust, only attaining a length of 17mm. Of the three coxæ the second is a little the largest; they all bear a few long setæ dorso-laterally, the

third coxa being the most deficient in this respect. The distal fringe is well developed ventrally on the second coxa, but more so on the third, and the ventral surface of this joint is covered with small setæ. The femur is short and stout, approximately equal in size to the second tibia, the first being a little longer. The setæ on these three joints are arranged in a thoroughly characteristic manner. There are two dorso-lateral rows and a lateral row, all of long, slender setæ. There is also a ventral row of comparatively short setæ, five rows in all. The setæ are much better developed on the second tibia than elsewhere. The distal fringes on these joints are normally developed; on the tibiæ they are ventral and spinous, more especially on the second tibia. The tarsus and propodus are short and much more slender than the rest of the limb. The two joints differ but little in size, the propodus being a little the longer. This bears a stout terminal claw and two well-developed auxiliaries. The setæ of these two joints are small, but have the same arrangement as on the other joints. The ventral row is, however, distinctly spinous, and a very prominent spine exists at the ventral end of the tarsus.

Only one individual of this species was taken, and its sex has not been determined. Coulman Island, 13 January, 1902; 100 fathoms, stony bottom.

CHLETONYMPHON BIARTICULATUM.

(Plate IV., fig. 2; Plate X., fig. 12.)

Specific characters:—

Body stout, tapering posteriorly, articulation deficient, lateral processes separated by variable intervals.

Ocular tubercle long and slender.

Palps five-jointed, proportions of last three as 3 : 1 : 1.

Oviger ten-jointed, denticulate spines not numerous, and with not more than five small teeth on each side.

Legs of moderate length, covered with rather fine setæ, terminal claw with small auxiliaries.

Body is stout and tapering posteriorly, with the lateral processes separated by a moderate interval, except the last two pairs, which are quite close together, the articulation between them being deficient. The distal extremities of the lateral processes are provided with slender spines, but these have enlarged bases and thereby become more prominent.

The Cephalon is short and stout, a very distinctly constricted neck separating the expanded portion, which forms two diverging lobes.

The Ocular tubercle lies immediately behind the neck and in front of the first pair of lateral processes. It is tall, slender, cylindrical, and bears four well-developed eyes at the extremity; there is no pigment.

The Abdomen is rather long, narrow, tapering to a blunt point, and not separated from the trunk by an articulation.

The entire body is covered with very fine setæ, not easy to distinguish, and in addition there are two long setæ dorsally near the posterior border of each segment,

two on each of the cephalic lobes, and one in the middle of each lateral process; these also possess dorsally a distal fringe of stout setæ with enlarged bases. The ventral surface appears to be quite devoid of setæ.

The length of the body is 9mm. and its width scarcely 5mm. The length of the trunk only (to base of abdomen) is 6mm.

The Proboscis is stout, cylindrical, and has a length, measured dorsally, of 3mm. It is covered with very fine but comparatively long setæ.

The Chelifori are well developed. The scape is single-jointed, reaching beyond the proboscis; it is stout and provided with rows of setæ having very stout bases and a few others as if misplaced. The distal fringe is very prominent, especially on the inner side. The chela approximately divides its length between the palm and the fingers; the former is covered with short and comparatively fine setæ, and these are continued well on to the base of the immovable finger. The fingers are inclined inwards, slender, much incurved at the tips, and furnished with a number of slender, closely-set teeth of fairly regular size.

The Palp arises laterally immediately below the chelifori (fig. 2a). The first joint is small and stout, the second is long, and extends nearly to the end of the proboscis; the third is shorter; the two terminal ones subequal and together shorter than the third, the proportions of the four joints being 5:3:1:1. The second joint is uniformly covered with fine setæ, as are the others. The setæ become more numerous and both longer and stiffer towards the extremity of the appendage.

The Ovipiger rises ventro-laterally immediately in front of the first lateral process; it consists of the normal ten joints, and is covered throughout with very fine delicate setæ (fig. 2b). Other and stiffer setæ occur sparingly on the fifth joint, more numerous on the sixth and the distal fringes of most of the joints, particularly the terminal ones. The first three joints are small, but progressively lengthen, the third having a very oblique termination. The fourth is a trifle longer than the first three together, the fifth is longer still, and the sixth is half the length of the fifth. The four terminal joints progressively shorten, the third being practically half the length of the first; the terminal one bears a slender curved claw, as long as itself, with nine slender teeth. The denticulate spines are not numerous, 7:5:4:4 (Plate X., fig. 12). They consist of a flattened tapering shaft with not more than five lateral teeth on each side, none of them large, and occurring nearer the base than usual, leaving the terminal portion of the shaft free. They do not appear to be much worn.

The Legs are not very long, extending to about 25mm. Most of the joints are very stout, but the tarsus and propodus are considerably reduced in diameter. Of the three coxæ the second is the largest, but not so long as the other two together; the proportions of the remaining joints are 5.5:6:5.5:3:2. The entire limb is clothed with fine setæ, but in addition to these are conspicuous rows of spinous setæ arising from enlarged bases. Two dorso-lateral rows occur on the first two coxæ, two rows occur dorsally on the femur, but here the spines are small; the two lateral rows are

much larger; but ventrally, this joint and the coxæ also are covered with normal setæ. These spines are best developed on the first tibia, two dorsal and two lateral rows being conspicuous, a ventral row of much finer spines occurs. On the second tibia all these five rows occur, but the spines are rather finer. The setæ of the two terminal joints are small without the enlarged bases, but arranged in the same manner. The terminal claw is long and slender, and is accompanied by two quite small auxiliaries. The distal fringes of the various joints do not present any unusual features.

The single specimen is a female, the Genital apertures are conspicuous on the second coxæ of all the legs.

Off the Barrier. January 27, 1902. 300 fms. Mud.

Lat. $78^{\circ} 25' 40''$ S., long. $185^{\circ} 39' 6''$ E.

CHÆTONYMPHON MENDOSUM.

(Plate IV., fig. 3; Plate X., fig. 13.)

Specific characters:—

Body robust and tapering, articulation imperfect, lateral processes not widely separated, and with stout spines distally and dorsally; no fine setæ whatever.

Ocular tubercle short and stout.

Palp five-jointed, proportions of last three 5·5 : 1·5 : 1·6.

Oviger ten-jointed, denticulate spines few, with four teeth on each side, two of them prominent.

Legs with five rows of spinous setæ, without enlarged bases; terminal claw with two small auxiliaries.

This species is very closely allied to the last, but is much smaller, and presents other differences which are usually regarded as of specific rank.

The Body is robust and slightly tapering, with stoutly developed lateral processes, the intervals between which are variable, widest but not very wide between the first and second pairs; the third and fourth being quite close together, the articulation between the two posterior pairs is not present.

The Cephalon is short, anteriorly expanded into two diverging lobes; the neck is distinct, but very little constricted.

The Ocular tubercle lies behind the neck, but not clear of the first pair of lateral processes.

The Abdomen is horizontal, long, extending considerably beyond the first coxa, ovoid, tapering to a blunt point; it completely fills the space between the two posterior lateral processes. All this is in close agreement with the preceding species. The differences are:—The complete absence of fine setæ from the entire body; the ocular tubercle is rather short, stout, and slightly inclined forwards, carrying four well-developed eyes with pigment on its rounded summit; the lateral processes all provided with two or three stout spines dorsally and distally; the spinous setæ of the legs, while having the same arrangement as in the preceding species, are, on the whole, stronger in themselves, but without the enlarged bases.

The length of the body is 6·5mm., and its width just exceeds 3mm.

The Proboscis is of moderate length, 2mm., measured dorsally, cylindrical but slightly swollen in the middle; it is directed downwards, and not setose at all.

The Chelifori are well developed; the scape is single-jointed, stout, and scarcely as long as the proboscis. A row of stout spines runs along its inner border, and a few spinous setæ constitute a distal fringe, and there are two or three scattered on the shaft. The chela is strong, the palm taking up half its length, and the fingers are set at a considerable angle. The palm is covered, but not thickly, with setæ. The fingers are slender, curved towards the tip, and provided with slender teeth of fairly uniform length, but not very closely set.

The Palp rises laterally, quite close to the proboscis, and consists of the normal five joints (fig. 3a). The first is short and stout, the second is the longest of the appendage and provided with a few long setæ; its proportion to the remainder is 9 : 5.5 : 1.5 : 1.6; the third is scantily supplied with setæ, the two terminal joints are rather more abundantly supplied; the last joint is ovoid instead of cylindrical.

The Ovigera arise ventro-laterally immediately in front of the first pair of lateral processes. They comprise ten joints of normal character (fig. 3b). The first three joints are quite short, stout, and progressively lengthening; the proportions of the three following are 7 : 9 : 5. Setæ become prominent, but not numerous, on the fifth and sixth joints; on the preceding joints they are almost non-existent. The four terminal joints are small, the proportions being about 4.5 : 3 : 2.5 : 2.75, the last one possessing a curved terminal claw, quite as long as the joint, with half-a-dozen rather widely separated teeth. All the terminal joints carry a few setæ distally and dorsally. The denticulate spines are not numerous, 5 : 4 : 3 : 4 respectively; they consist of the normal flattened blade with two prominent teeth on each side, and two others of which traces remain. They are rather worn. (Plate X., fig 13.)

The Legs are rather short, about 16mm., very stout, but the tarsus and propodus are very much reduced in diameter. Of the three coxæ the second is much the longest, but not so long as the other two together. The first is provided dorso-laterally with two stout spines, and there is another rather smaller one laterally, on the posterior side. A row of spinous setæ occur laterally on the other two coxæ. The distal fringes of these two joints are ventral and inconspicuous; that of the third coxa is the best developed, and on this joint there are several small setæ ventrally in addition. The three following joints are subequal in size, the tarsus and propodus together are three-quarters the length of the preceding joint, and are themselves subequal. In these particulars this species is not in agreement with the preceding. On the two tibiæ there are two dorsal rows of stout spinous setæ, a lateral row on either side, and a strongly developed ventral row. On the second tibia the distal fringe is strongly developed ventrally, and spinous. The setæ on the femur are smaller, and only the two dorsal rows are distinct; the other three rows are present, but very feebly developed; there is a prominent distal fringe dorsally. The tarsus and propodus are similarly provided, but the setæ are much smaller. The terminal claw

is stout, not half the length of the joint that bears it, and provided with two small auxiliaries.

The specimen described above is an adult female with Genital apertures on the second coxæ of all the legs. Nearly mature ova can be seen in the femora.

It was taken in Winter Quarters, in 125 fm., 24 April, 1903. Bottom: small stones, organic débris, polyzoa, shells, etc. Other specimens, generally smaller, were taken at the same place on various dates, and also at other points three and nine miles away, and at the same or greater depths, 180 fm. They all appear to be sexually mature, and differ in a varying degree from the type in their spinose character. In all cases this is more conspicuous in the males. The Genital apertures of the male are on the two posterior pairs of legs only.

The numerous minor features which separate this species from the preceding cannot, in my opinion, be ascribed to age. The form of the ocular tubercle readily separates the two.

A specimen was taken in 125 fm. on 3 May, 1903, and is, I think, a young form of this species. The differences between this specimen and the adult individuals are:—

The posterior articulation of the trunk is present, but very much less distinct than the others.

Palps: the second joint is as long as the three following together. The third joint is as long as the two terminals together, and of these the last is a little the longer.

Ovigers: these are quite rudimentary, small, and hook-like; no joints are differentiated, though two are indicated.

Legs: the proportions of the joints differ somewhat and are, beginning with the femur, 6 : 7 : 7 : 2.25 : 3.5. The limb is clothed with comparatively strong spinous setæ of some length, not very numerous, arranged in lines.

CHÆTONYMPHON AUSTRALE.

(Plate X., fig. 14.)

Nymphon australe, Hodgson (10), p. 257.

Chatonymphon altiocularum, Möbius (23), p. 181.

Specific characters:—

Body robust, with lateral processes not widely separated but divergent; entire animal rather coarsely setose.

Ocular tubercle long and slender.

Palps five-jointed, proportions of last three as 7 : 4.25 : 4.

Oviger ten-jointed, denticulate spines fairly numerous, with four distinct lateral teeth on each side.

Legs short, tarsus a little longer than the propodus, the terminal claw with very minute auxiliaries.

Body robust, with stoutly developed lateral processes, which are distinctly though not widely separated, the interval increasing with age; the body, exclusive of the anterior part of the cephalon, forming an oval of graceful proportions.

The Cephalon is expanded, and the space between the chelifori is marked by a deep groove, wide anteriorly. The neck is well defined, and behind this is the Ocular

tubercle, a structure which varies considerably in shape and size. As a rule it is rather stout, and bears four well-developed eyes, with a variable amount of pigment. It is slightly flattened antero-posteriorly, and more or less rounded at the extremity. The cephalon and the lateral processes are provided with several long setæ, the latter also having a distal fringe.

The Abdomen is of moderate dimensions, pyriform, and rather thickly setose, not separable from the trunk by an articulation.

The Proboscis is cylindrical, slightly enlarged about its middle. It is directed downwards, and movably articulated to the trunk. No setæ are apparent on its surface.

The length of the entire body is 8mm. ; of the body only, 6mm. ; of the trunk, to the insertion of the abdomen, 4.5mm. Its width is 3mm.

The Chelifori are well developed ; the scape is a single joint longer than the proboscis, liberally provided with long setæ of irregular size, and also having a well-marked distal fringe. The chelæ are slender, about as long as the scape. The palm occupies half the length of the entire chela, and is covered with comparatively long setæ, which are continued far on to the immovable finger. The fingers are slender and much incurved at the tips ; they are provided with a large number of closely set teeth of irregular length.

The Palps are slender and five-jointed. The first joint is quite small, the second is the largest of all, and rather sparingly provided with setæ, which are longest on its outer side ; the third joint is a little shorter, slightly enlarged distally, the setæ being more numerous and more uniform than on the preceding joint. Of the two terminal joints the distal one is a little the shorter, but together they exceed the length of the second by a trifle. These two joints are richly setose, particularly on one side.

The Oviger is ten-jointed ; in the female the first three joints are very small, but progressively increase in length. The fourth and fifth are subequal and much the longer of the whole series, and slightly curved in opposite directions. The sixth joint is about three-quarters the length of the fifth. Of the four terminal joints the first three progressively shorten, the terminal one being a trifle longer than the preceding, and it bears a long slender pectinate claw with eight teeth. The first four joints bear scarcely any setæ, except an inconspicuous distal fringe ; on the fifth the setæ are noticeable on its outer border, and those of the distal fringe are rather long and slender. In this particular the sixth joint is similar. The four terminal joints are all provided with a distal fringe and a number of long setæ. The denticulate spines are arranged as usual in a single row, and, counting the joints from the base of the appendage, they bear respectively 9 : 7 : 5 : 7 of these spines (Plate X, fig. 15). These numbers are not, however, rigidly adhered to. The spines consist of flattened shafts of a slightly sinuous form, bearing four well-developed teeth on each side, with traces of a fifth in large and uninjured specimens. The third tooth from the base is usually the

largest. In the fully developed male the fifth and sixth joints are remarkably swollen. The enlargement of the fifth joint affects the distal half. The eggs are large, and the spherical masses may be two in number on each limb; they are carried round the fourth joint.

The Leg extends to a length of 21mm. These appendages do not differ appreciably in size. Of the three coxæ the second is much the longest, but not so long as the other two together. The proportions of the three following joints are as 4 : 5 : 4·5. The tarsus and propodus together are as long as the femur, the former joint being the longer of the two. The terminal claw is well developed, and is accompanied by two very minute auxiliaries, not one, as stated in the 'Southern Cross' Collection, Crustacea, p. 258. The entire limb is setose throughout, the setæ abundant, and variable in size, some of them distinctly spinous. For the most part their arrangement is irregular, but on the second tibia a linear arrangement begins to be perceptible, and this is clear on the tarsus and propodus, where the setæ are much finer. The distal fringe of the first coxa is dorsal, and not so strongly developed as on the two following joints, more especially the third, where it is ventral. On the femur it is chiefly dorsal, and the setæ composing it are long and stout. On the first tibia it is complete and rather spinous ventrally; this is more strongly developed on the second tibia, where there is at least one powerful spine ventrally, and generally two on each side. The male differs from the female in being more setose, the setæ being longer, more irregular, but scarcely, if any, stronger. The distal fringe of the third coxa is particularly noticeable for the great length of the setæ composing it.

The Genital apertures of the female are conspicuous on the second coxa of all the legs; those of the male are much smaller, and can only be detected on the two posterior legs.

This species was taken in considerable numbers off Cape Adare, but inside Robertson Bay, in 20–26 fm. None were taken by the 'Discovery.' I have re-described it here to remove certain defects of the original description, and on account of the capture of a form which, after considerable hesitation, I feel compelled to regard as only a variety. This species is closely allied to *N. brevicaudatum* Miers, with which *N. horridum* Böhm has been identified by subsequent investigators. *N. brevicaudatum* Miers, can be readily distinguished from *N. australe* by the following characters:—

The trunk is more setose.

The tarsus is shorter than the propodus.

The terminal claw has two distinct, if small, auxiliaries.

The oviger bears a very much smaller series of denticulate spines, but their lateral teeth are more numerous.

I am unable to regard the *Chætonymphon altiocolatum* of Möbius as a distinct species, several examples of which were taken in the vicinity of Bouvet Island during the 'Valdivia' expedition.

CHÆTONYMPHON AUSTRALE, var. AUSTRINORUM.

(Plate IV., fig. 4; Plate X., fig. 15.)

Although no specimens of *Chætonymphon australe* were taken by the 'Discovery,' yet a large number of individuals of a closely allied species were taken in Winter Quarters, chiefly at the beginning of our stay there, before the ship was frozen in, and while dredging was still possible within the 20-fathom line.

At first sight these specimens seem to be a distinct species; they are half as large again or more, and their setose covering is finer. The intervals between the lateral processes are much greater, and this is the only character of importance that separates them. Another feature of doubtful value lies in the fact that the tarsus and propodus together are distinctly shorter than the femur. In *C. australe* these two joints are as long as the femur, or very little shorter, but the slight variation that occurs prevents the acceptance of this fact as a reliable specific character.

The setose covering has already been alluded to as finer; it is so, but subject to considerable variation both as to quality and quantity. In average specimens there are large spinous setæ on the tibiæ, especially on the second. These are, for the most part, arranged in a line but not very distinctly. Two dorsal rows, and a lateral row each side can be distinguished, these are most prominent on the second tibia. There may also be a mid-ventral row of very small spinous setæ, rather closely set. Both in *C. australe* and the specimens from Winter Quarters the ventral setæ of the femora and the two tibiæ are much less conspicuous than elsewhere. In many individuals there is a conspicuous mid-ventral row of setæ on the tarsus; these are closely set and about as long as the diameter of the joint.

Two specimens were taken in 100fm. off Coulman Island; of these one is comparatively small. The Ocular tubercle is rather more conspicuously flattened and very slightly constricted below the eyes. The setæ are as in the Winter Quarters specimens, but without the spinous rows which, as before noted, are not always obvious. Two other specimens were taken off the Barrier in 300fm. Lat. 78° 25' 40" S., long. 185° 39' 6" E. These are both males, one with young. In these the Ocular tubercle is flattened, as in the Coulman Island specimens, and the terminal claw of the leg is rather longer and more slender. The setose covering of the legs is very much finer, but its arrangement is exactly the same.

It is quite impossible to find a distinct character by which these specimens can be separated from *C. australe*, therefore I feel compelled to regard them as a variety only, and a more southern form of that species. Some comparative measurements are given below.

	<i>C. australe.</i>	<i>C. australe</i> , var. <i>austrinorum</i> .		
		W. Q.	Coulman.	Barrier.
Length of entire body	8mm.	11	7	12
Length of body	6mm.	8	5.5	9.5
Length of trunk, to insertion of abdomen	4.5mm.	6	4	7

	<i>C. australe.</i>	<i>C. australe</i> , var. <i>austrinorum</i> .							
		W. Q.	Coulman.				Barrier.		
Length of abdomen	1.5mm.	2	1.5	2.5			2.5		
Width of trunk	3mm.	4	3	scarcely 5			scarcely 5		
Length of third leg	21mm.	31	18	32			37		
Proportions of femur and two tibiae	4 5 4.5	6 3.5	7.75 4.5	7 4	6	9 8	7 9 8.5		
Tarsus and propodus together	As long as femur, or very nearly.				Shorter than femur				

In all cases the tarsus is longer than the propodus.

The Palps are alike in all cases, but these have not been accurately measured, as this cannot be done without removal.

Fig. 4a is that of a Winter Quarters specimen.

The Ovigera are essentially alike, the differences between one or two of the joints being very trivial (fig. 4b). The number of denticulate spines is too irregular to be of any value.

♀ 9 : 7 : 5 : 7. ♀ 11 : 7 : 5 : 8. ♂ 11 : 9 : 7 : 9.

The character of these spines is shown in Plate X., fig. 15.

The sexual difference in these organs is the same in all, and the ova, which are known in all but the Barrier specimens, are large and attached to the oviger in precisely the same way.

PENTANYMPHON.

Body smooth, very slender, with lateral processes widely separated. Five pairs of legs. Chelifori well developed, chelate; scape a single joint. Palps five-jointed.

Ovigera ten-jointed, terminating in a pectinate claw, the last four joints with a single row of denticulate spines.

But for the additional pair of legs it would be quite impossible to separate this genus from *Nymphon*. Only a single species is for the present recognised, and this appears to have a circumpolar distribution. It has been taken by the Scotch, German, and French Expeditions.

PENTANYMPHON ANTARCTICUM.

(Plate V.)

Pentanympyon antarcticum, Hodgson (11), p. 458; Cole (7), p. 405; Bouvier (3), p. 294.

Specific characters:—

Body very slender, lateral processes long and widely separated, neck very long.

Chelifori: chelæ long and slender, shorter than scape, with short, stout, uniform, close-set teeth.

Palps: terminal joint longer than preceding, which is in turn half the length of the third.

Ovigera: terminal claw pectinate, denticulate spines, with seven pairs of lateral teeth, the first being very small.

Legs rather long and slender, with a well-developed terminal claw and two auxiliaries; setæ arranged in four rows on the last three joints.

The body is very slender, quite smooth, with very widely separated long lateral processes. Anteriorly it is slightly curved downwards.

The Cephalon is long and slender, longer than the second and third segments, and expanded distally into two dorsal lobes for the articulation of the chelifori.

The Ocular tubercle lies immediately in front of the first pair of lateral processes. It is short, merely a low rounded hump, in fact, bearing four well-developed eyes.

The Abdomen is very small, directed upwards, and not separated from the trunk by an articulation. It is rather conical and extends but little beyond the trunk, not nearly so far as the posterior lateral processes.

The segmentation of the trunk is distinct, the joints occurring immediately behind the lateral processes.

The Proboscis is directed downwards, cylindrical, with a slight swelling about the middle of its length; it is as long as the cephalon, and its extremity is rounded.

The Chelifori arise above the proboscis, each on a lobe of the cephalon, which is here rather more than twice its diameter posteriorly. The scape is single-jointed, longer than either the proboscis or the chela. A few delicate setæ are scattered along its length, and there is an inconspicuous distal fringe. The chela is a little shorter, the palm and dactyli occupying equal halves; the former is covered with fine setæ which also form a fringe round the base of the movable finger. The fingers are slender and much curved near the tips. Both are provided with a row of fairly stout teeth of nearly uniform size, rather closely set.

The Palps arise below the chelifori and at the sides of the proboscis; they are built on exactly the same plan as in the genus *Nymphon* (fig. 1a). The first joint is small and stout, the proportions of the remainder being 8 : 5 : 3 : 4. The second joint is sparingly setose except for a distal fringe; the other joints become more and more setose to the last, which is richly supplied. On the outer side they are more abundant than elsewhere.

The Ovigera are ten-jointed and present in both sexes. (Fig. 1b.) They arise from very short but conspicuous processes on the lower side of the cephalon, immediately in front of the first pair of lateral processes. The details of this appendage are as in *Nymphon*. The first joint is very small, the second is twice the size, and the third, which has a very oblique termination, is a little longer still; none of these bear setæ. The fourth joint is very long, slender, and slightly curved; it carries a glandular aperture on its outer side about a quarter of its length; all the setæ are small; very few occur except as a distal fringe. The fifth joint is longer still, the longest of the appendage, and its distal half is enlarged in diameter; it is covered throughout with fine setæ. The sixth joint is rather more than half the length of the fifth, slightly curved, and on the outer side of the curve plentifully supplied with fine setæ. Of the four terminal joints the first is little more than half the length of the preceding, the other three are shorter and sub-equal; very few setæ occur, except distally. They carry a single row of denticulate spines (fig. 1c). These

spines consist of a slender shaft with a swollen base; near the base is a pair of small teeth followed by two pairs of comparatively long slender ones; the remaining four pairs are more slender and blade-like, graduating to a mere trace. The terminal claw is furnished with about nine slender teeth. Both denticulate spines and terminal claw are frequently very much worn.

With regard to the Legs, all five are practically of the same size and proportions, and though there is a considerable amount of variation in this respect it is confined to narrow limits. They may attain a length of as much as 36mm. Of the three coxæ, the first and third are sub-equal and together about as long as the second; all, especially the third, bear a few minute setæ, chiefly ventral. The proportions of the three following joints are approximately as 6.5:7 and 10; the tarsus and propodus are long and slender, the former being the longer. The limb is more or less covered with fine setæ. On the femur they are scanty and for the most part small; a few longer ones are to be found along the shaft and distally. On the first tibia they are comparatively long and arranged in four indistinct rows, of which the lateral ones are not easy to observe. On the second tibia they become smaller and much more numerous, especially distally, and the distal fringe is strongly developed ventrally. The same arrangement holds good for the two remaining joints, but the ventral row is very strongly developed, the setæ becoming almost spinous and closely set. The terminal claw is a powerful one, and is accompanied by two slender auxiliaries of about quarter its size.

The Genital apertures of the female are found on the second coxæ of all the legs, and in the adult they are distinct enough. The apertures of the male are at all times difficult to observe, and I have only been able to distinguish them on the three posterior pairs of legs.

Nearly thirty specimens of this species were taken in Winter Quarters, at all times of the year, and in depths ranging from 12 to 125 fathoms. They vary considerably in size, a variation obviously due to age, but in essential details they are in agreement except in one particular, and that is the articulation of the abdomen to the trunk; in certain cases among the more robust forms it is distinctly articulated. The trunk in all cases is seen to be very minutely scabrous when removed from spirit. The females are more robust than the males when the sexes can be separated, a feature which is most noticeable in the femora, but extends to the first tibiæ. The males, as a rule, are rather more setose than the females.

A few of the eggs borne by one of the males are hatched. On emerging from the egg the body is ovoid, and possesses three pairs of appendages. The cheliforus comprises a stout scape with one very long seta, and a small but well-developed chela, without teeth on the dactyli; a small proboscis lies below these. Details of the other two pairs of appendages cannot be seen without special preparation, which has not as yet been undertaken. Other specimens crawling about the egg-masses show the proboscis, chelifori, the palps not clearly jointed, and four pairs of appendages, having

three stout sub-equal joints, followed by a fourth nearly as long as the three together, only a great deal more slender, and terminating in a very minute claw; a conical abdomen lies at the extremity of the trunk, the posterior part of which is provided with a small number of very long setæ.

LEIONYMPHON.

Prof. Möbius (23) has described this genus as follows:—

“Körper kurzhaarig. Rumpf breit. Beinträger am Grunde zusammenstossend. Hals kurz und breit. Augenhügel konisch mit 4 Augen. Rüssel walzenförmig. Finger ohne Zähne. Palpen neungliedrig. Brutbeine zehngliedrig, 7. Glied beim Männchen kurz und dick; alle Glieder nur kurz behaart.”

LEIONYMPHON, *n.g.**

Rumpf ebenso breit wie lang. Die beintragenden Seitenforsätze der Rumpfglieder stossen zusammen. Kopfsegment breit. Augenträger konisch.

Rüssel walzenförmig. Scheren kurzer als der Rüssel. Finger ohne Zähne. Palpen neungliedrig.

Brutbeine zehngliedrig ohne eigentümlich geformte Dornen oder Zähne an den 4 letzten Gliedern. An den männlichen Brutbeinen ist das 7. Glied sehr kurz, aber viel dicker als die andern 3 Endglieder.

This genus was established for the reception of a remarkably fine species, *L. striatum* (Möbius), of which however only two examples were taken, and both of them immature. A species in the same collection described by Prof. Möbius as *Colossendeis gibbosa* appeared to me to be closely related, and an examination of the two species which I have been permitted to make fully confirmed this suspicion. The ‘Discovery’ has brought from the Antarctic several species which are unquestionably very closely related. The ‘Français’ (2) has also found two species. Two more were described some years ago by Dr. Pfeffer (24), from South Georgia, and placed by him in the genus *Ammonothea*.

That the genus *Leionymphon* is very closely related to *Ammonothea* is beyond all question. To this latter genus not less than thirty species have been ascribed, but many of them present such peculiar characters that they cannot fairly be included. It is not possible here to revise the genus, but I have considered it desirable to modify Prof. Möbius’ definition of the genus *Leionymphon*, and to give a list of those species which I consider should be included therein.

LEIONYMPHON.

Body more or less robust, with transverse ridges developed to a greater or less extent. The lateral processes widely separated or otherwise; spurs rather than spines, or traces of them, occur on the lateral processes and first coxæ.

The Proboscis is large, cylindrical or pyriform.

The Palps are nine-jointed, the last five joints being short.

* “*λεῖος* glatt. Die 4 letzten Glieder der Brutbeine sind nicht mit eigentümlich geformten Zähnen oder Dornen besetzt.”

The Ovipositor is ten-jointed, without a terminal claw, the last four joints with an irregular series of special spines. In the male, the seventh joint bears a tuft of setae, and the eighth and ninth joints are articulated at a considerable angle to the preceding joints.

The Legs are long, tarsus very small, propodus armed proximally on the ventral margin with a series of stout spines, claw rather large, and accompanied by two well-developed auxiliaries.

The Genital apertures occur in the male on the two posterior pairs of legs; in the female on all the legs.

The species I would assign to this genus are :—

L. striatum, Möbius, 1902.

L. grande, Pfeffer, 1889 = *Ammotheta grandis*, Pfeffer.

= *Ammotheta charcoti*, Bouvier.

L. gibbosum, Möbius, 1902 = *Colossendeis gibbosa*, Möbius.

L. minus, sp. nov.

L. clausii, Pfeffer, 1889 = *Ammotheta clausii*, Pfeffer.

L. australe, sp. nov.

L. glaciale, sp. nov.

L. spinosum, sp. nov.

I have hesitated for some time as to the position of *Ammotheta magniceps* (Thomson) from New Zealand (30). Mr. G. M. Thomson most kindly placed the whole of his collection at my disposal, but unfortunately it does not contain an adult male of this species, therefore the structure of the male ovipositor remains unknown. The transverse ridges of the trunk are prominent, but there is no trace whatever of the spurs so characteristic of *Leionymphon*. Under any circumstances, the species cannot be regarded as a true *Ammotheta*. (Mr. Thomson is in error in describing the palp as with ten joints, there are only nine.) Be the true position of this species as it may, it exhibits a preliminary stage in the transition between the diminutive *Ammotheta* and the large *Leionymphon*. The next step is indicated by *L. clausii* and *L. australe*; these two species are very much alike; from these by *L. minor*, *L. gibbosum*, and *L. grandis* to *L. striatum*. It would be difficult to give *L. glacialis* and *L. spinosum* a position in a linear series. They probably diverge from *L. striatum* in a different direction to the others.

KEY TO THE SPECIES.

Body traversed by three prominent pyramidal ridges, spinose or setose :—

Lateral processes close together—

*Proboscis half as long as body, cylindrical. *L. striatum*.

Proboscis little longer than body, cylindrical. *L. grande*.

*Proboscis as long as body, conical. *L. gibbosum*.

Proboscis shorter than body, slender, pyriform. *L. minus*.

Lateral processes widely separated—

Proboscis little shorter than body. *L. glaciale*.

Proboscis short, not half length of body. *L. spinosum*.

Body traversed by three rounded ridges, smooth :—

Abdomen vertical, base traversed by the last trunk articulation. *L. clausii*.

Abdomen oblique, some distance behind the last trunk articulation. *L. australe*.

* Known only from immature examples.

LEIONYMPHON GRANDE.

(Plate VI., fig. 1.)

Ammonothea grandis, Pfeffer (24), p. 43.*Ammonothea charcoti*, Bouvier (2), p. 295.

Specific characters :—

Body robust, with three prominent transverse ridges dorsally and ventrally.

Proboscis cylindrical, very little longer than the body.

Palp 9-jointed, the last joint a little longer than any of the four preceding ones.

Oviger 10-jointed, without a terminal claw, the last four joints with simple curved spines, which increase in size to the extremity of the last joint.

The body is stout, and with the abdomen, scarcely as long as the proboscis, being just less than 15mm. Its width across the second pair of lateral processes is 10mm. Its segmentation is complete, but concealed by a very strongly developed pyramidal ridge which lies along the posterior margin of the three anterior segments, and the apex of which is raised considerably above the body level. These ridges have a very slight curvature forwards, which is most marked in the first. The lateral processes are not widely separated, the two anterior pairs are directed forwards, the first more than the other, and are quite close together; the third pair is directed backwards slightly with a wider interval between it and the preceding pair; the last pair is directed backwards at such an angle as to make the interval between the third and fourth pair very conspicuous. All have a swelling at the distal extremity, and this swelling gives the process an angular appearance.

The Cephalon is short, expanded anteriorly, and at the base of the chelifori presents the same angular appearance as the lateral processes. A slight median groove divides its anterior margin.

The Ocular tubercle lies in the middle; it is stout, with a very slight curvature, rounded at the apex, and bearing four well-developed eyes.

The Abdomen rises from the extremity of the trunk, but without trace of segmentation; it is rather stout, slightly curved, and directed upwards. There is a median tubercle between the posterior transverse ridge and the abdomen. Dorsally the entire body is rendered scabrous by the presence of small spinous setæ; between the body ridges however they are scarce. Ventrally the three transverse ridges of the dorsum are represented by three similar ridges, thinner and not produced to such a conspicuous point; all are directed backwards to a varying degree, the first more so than the others. These ridges are continued on to the base of the lateral processes, which here do not present any trace of the angular enlargements so conspicuous dorsally. The spinous setæ of the dorsum are not present.

The Proboscis is stout and cylindrical, only a trifle longer than the body and abdomen together. It is articulated to the body, and movable through a very considerable angle. The mouth is large and triangular. The distal extremity of the organ is deeply pigmented; for nearly three-quarters of its length it displays six

bands of a dark yellowish-brown colour; it then abruptly changes colour, and tapers a little to its junction with the body.

The Chelifori are rudimentary, and arise from the cephalon dorsal to the proboscis, and rather in advance of its origin. The scape is short and stout, slightly curved, and with the distal extremity oblique. Articulated to it is a mere knob which bears at its extremity a minute tubercle in a distinct socket, and on its outer border a small spine. The entire appendage is covered with minute spinous setæ.

The Palps are nine-jointed, and arise from the cephalon immediately below and external to the chelifori. The first joint is small, and the second is very nearly four times as long, the third is again small, and the fourth nearly twice as long as the second. The remaining five joints are together but little longer than the fourth, and differ but little in size; the terminal one, however, is the longest of this series. The entire appendage is covered rather irregularly with the characteristic small spinous setæ of the animal. They are not numerous on the proximal four joints, but on the remaining five they are rather longer and finer, as well as being a little more abundant.

The Ovigera are ten-jointed, and arise ventrally at the angles formed by the first pair of lateral processes and the body. All the joints are small, the second and fourth being a little the longest (fig. 1a). The first joint is very small but stout, the second and fourth are the longest and sub-equal, the third is shorter and slightly curved. From the fourth the three following joints progressively decrease a little in length, the first three forming a curve in the natural position of the appendage. All these joints are stout, the three terminal ones becoming more and more slender; the eighth joint, though more slender, has the same character as the preceding, the ninth is a little shorter, and the last one is the longest of the four terminals. The entire limb is covered, but not thickly, with small setæ; they are most numerous on the fourth, fifth, and sixth joints, on the latter of which they are conspicuous only on the outer side of its curvature. The remaining four joints form a curve in a contrary direction, and on the inner side of this curve is a row of stout curved setæ, increasing in size and strength to the end of the terminal joint, where they form a conspicuous group. These spines are quite simple, and the last joint does not bear a claw, though it seems adapted for one.

The Legs are stout but not of any excessive length, being something like 62mm. The second coxa is fully as long as the other two together, and the proportions of the remaining joints are as—15 : 13 : 17 : 1 : 5. The first coxa is marked with a median dorsal and ventral line which separates the muscles moving the succeeding joint, the distal margin is tuberculated dorsally like the lateral processes, but only to a very slight extent; the second coxa is conspicuously wider in diameter at its distal than at its proximal extremity. All three are covered with very small but stout setæ. The femur is a stout joint, its distal extremity being raised dorsally into a slight angular ridge; the entire joint is covered with the characteristic setæ with the exception of a

lateral band of some width, almost completely bare of them. On the two tibiae the same arrangement of the setae occurs, except that along the middle of the bare band there is a narrow band of setae two or three wide. The distal fringes of the femur and first tibia are not conspicuous, but that of the second tibia is formed of stout spines chiefly on the ventral surface. The tarsus is a very small joint, and forms a cup-like socket for the propodus (fig. 1b); it is thickly covered with small spines, and its distal fringe is well developed, especially ventrally, where it is formed of very stout spines. The propodus is covered thickly with stout setae with only an irregular vestige of the bare band found on other joints; it is slightly curved, and its ventral side bears proximally four or more very stout spines, of which the first is the smallest; the rest of the margin is taken up with setae small, but larger than the average; close to the terminal claw is a group of large setae, one of which at least is a rather prominent spine. The extremity of the joint is oblique, and forms a rounded spinose projection or heel beyond the origin of the stout claw, which, with its two powerful auxiliaries, arise from a common investment.

The single adult specimen captured is a female, and the Genital apertures are conspicuous on the second coxa of each leg. Five smaller specimens were, however, taken at the same time and place, varying in size from 9.5 mm. to 18.5 mm. over all. These present several differences of no small importance. The proboscis differs slightly in form, being more tapering the smaller the specimen, and it is also more rigidly articulated to the body; in none of them is it movable through so large an angle as in the adult. The chelifori are proportionally the same size as in the adult, but a perfect chela is developed. This is small and feeble, the fingers curved like a pair of callipers, and devoid of teeth. On the body the dorsal ridges are raised into a more definite median point, and the tubercles which give an angular appearance to the lateral processes and first coxae of the adult are now rather more prominent and carried on to other joints. The pre-abdominal tubercle is a very variable structure, and is sometimes prominent—in one case almost absent. The palps do not call for any fresh description, but the ovigers show several interesting stages in their development (figs. 1c-1f). In the smallest specimen only the merest vestige of such an appendage exists. In the next specimen four joints as such may be distinguished, the last one showing an indication of future segmentation. In another, six joints are fairly well established, the penultimate one showing traces of another division. In the largest of the immature specimens the oviger possesses the full number of ten joints, but they are very small, and the four terminal ones are only indicated and not clearly developed.

Cape Wadworth, Coulman Island, 8-15 fathoms. Bottom: stones. Several adult specimens were taken by the 'Français' off the west coast of Graham's Land, and one was taken by the 'Scotia.' The examination of Professor Pfeffer's *Ammothea grandis* from South Georgia has established the identity of this species beyond all question.

LEIONYMPHON MINUS.

(Plate VI., fig. 2.)

Specific characters :—

Body rather robust, with three prominent transverse ridges produced to a point in the mid-dorsal line.

Proboscis shorter than the body, slender, pyriform.

Palp 9-jointed; the terminal joint twice as long as any of the preceding four.

Oviger 10-jointed. In the male the three terminal joints bear an irregular series of stout but simple spines. No terminal claws.

The body is rather robust and the lateral processes are clearly but not very widely separated. It measures rather less than 5 mm. in length and less than 4 mm. in extreme width. The segmentation is distinct, and the articulations lie at the hinder part of the three transverse ridges which cross the body. These ridges are strongly developed, produced to a point in the middle line, and slightly curved backwards. They are equally prominent ventrally, but inflected backwards and not produced into a point. The lateral processes are stout, the two anterior being directed forwards at slightly different angles, the two posterior ones are similarly directed backwards; each bears dorsally two distinct tubercular processes which are also to be found in a less prominent degree on the first coxæ.

The Cephalon is scarcely, if at all, expanded, and its centre is occupied by a very stout Ocular tubercle which is directed slightly forwards, and appearing, in certain aspects, to be enlarged near its extremity, which bears a very rudimentary spine. The four eyes are not particularly well developed.

The Abdomen is short and stout, not separated from the trunk by an articulation; it is directed obliquely upwards and does not extend as far backwards as the last pair of lateral processes.

The Proboscis is pyriform, slender, and about two-thirds the length of the body, to which it is flexibly united. It shows indistinctly three pairs of longitudinal bands along the greater part of its length.

The Chelifori are rudimentary; the scape is well developed, slightly curved, and bears only a few small setæ besides the rather prominent distal fringe. The chelæ are reduced to a knob with the merest traces of fingers.

The Palps are 9-jointed and rise at the side of the proboscis; the first and third joints are quite short and subequal, the second and fourth are also subequal and about five times as long; the four following are quite short and subequal, while the terminal one is ovoid and twice as long as any of the preceding four. The fourth joint bears a small distal fringe, but otherwise there are practically no setæ on the first four joints; the following four joints are very considerably dilated ventrally, and this enlargement bears a dense tuft of small stiff setæ. The terminal joint is more extensively covered with setæ, especially on its ventral side.

The Ovigers are 10-jointed and rise ventrally just in front of the first lateral

process (fig. 2a). The first joint is small and stout, the second is more than twice as long, stout and enlarged distally, the third is scarcely as long and has an oblique termination. These three joints form a curve in one direction, and the three following form a similar curve in another. The fourth and fifth joints are long and subequal, the sixth being about half the length of either; its termination is rounded, the following joint being articulated at the side. All these joints are more or less plentifully setose; the setæ are very small, but their structure and arrangement call for no comment. The seventh and succeeding joints progressively decrease in length and stoutness as far as can be made out from the angle at which they lie, and they are all small. The seventh lies at right angles to the sixth, and near its distal and inner side it bears a dense tuft of long setæ. The eighth joint is articulated at the side of the seventh and at right angles to it; it also bears a small tuft of long setæ near its distal extremity but on its outer side; the following joint is similarly provided, but with fewer. The last three joints bear an irregular series, not a single row, of stout spines (fig. 2c); most of them occur on the terminal joint, but there are scarcely a dozen altogether. There is no terminal claw.

The Ovipiger of the female is essentially different to this (fig. 2b). All the joints are smaller, the third conspicuously smaller than the preceding, and the fourth, though the longest of the appendage, is still quite short, and the remainder gradually and progressively decrease in length. Up to the sixth the joints remain stout, the rest are much more slender, and there is nothing noteworthy in their articulation, which is quite normal. The sixth joint is thickly covered on its outer side with minute setæ, and up to this joint the setæ have been increasing in number. The terminal joint is unfortunately missing in the specimen examined, but the three preceding are almost devoid of any setæ at all.

The Legs measure about 28 mm. in length. The second coxa is scarcely the length of the other two together, the femur measures some 7 mm., the first tibia is the merest trifle shorter, the second a little longer, 7.5 mm., the tarsus and propodus together are about one-third the length of the second tibia. The second coxa bears a small but distinct tubercular enlargement just beyond the middle of its length dorsally, and in the male there is a similar tubercle dorsally near the extremity of the femur, with a glandular aperture upon it. The entire limb is setose, but the setæ are very small; no definite arrangement can be seen as far as the first tibia, up to this joint they are not numerous and only visible with difficulty. On the tibiæ they become numerous; on the first their arrangement is indistinct, on the second it is more readily made out, and consists of a dorsal and a ventral band of setæ with another narrow band passing along the centre of a bare space laterally. The distal fringes are but poorly developed, the most conspicuous one being on the second tibia and chiefly ventral. The tarsus is a very small cuplike joint, densely setose on its longer and ventral margin. The propodus is slightly curved and dorsally projects considerably beyond the insertion of the large terminal claw and its strong auxiliaries. The joint is thickly covered with stout

setæ on its ventral surface, and proximally there is a row of some four to six very strong spines; dorsally the setæ are similar, but not so thickly distributed nor so strong; laterally also they occur, and there appears to be a narrow band devoid of setæ, but this is not distinct. The terminal claw and its auxiliaries arise from a process on the ventral side of the prolongation alluded to above.

The type of this species is an adult male bearing eggs, taken in Winter Quarters at a depth of 125 fm., 9 Feb., 1903. Another was found at a depth of 35 fm., 5 March, 1903. The ova are small and are carried in a large, rather irregular mass round the fourth and fifth joints of the oviger. The Genital apertures occur ventrally at the distal extremity of the second coxa of the two posterior legs. They are large, with tumid lips. Genital apertures of the female are on all the legs. A male and a female were also taken off Cape Wadworth, Coulman Island, in 8-15 fm., 15 Jan., 1902. These are smaller than the type.

LEIONYMPHON AUSTRALIS.

(Plate VII., fig. 1.)

Specific characters:—

Body robust, with three low rounded transverse ridges; these ridges are more prominent ventrally. Abdomen directed obliquely upwards, and well behind posterior trunk articulation.

Proboscis pyriform, little shorter than the body.

Palp 9-jointed, the seventh and ninth being a little the longest of the five terminal joints.

Oviger 10-jointed, without a terminal claw, the last four joints with an irregular series of denticulate spines.

The body is robust and, without taking the lateral processes into consideration, broadest about the third process, from which it gradually narrows forwards.

The Cephalon is but slightly expanded and the neck is not distinct. The entire body measures 9 mm. in length, of which 4 mm. are taken up by the proboscis; the Abdomen does not enter into consideration, as in its natural position it is carried obliquely upwards, and does not extend beyond the last pair of lateral processes; it is, however, $1\frac{1}{2}$ mm. long. Segmentation is distinct, except so far as regards the abdomen, and occurs on a low ridge which crosses the body immediately behind the lateral processes. These ridges also occur ventrally and, being reflected backwards, give to each segment the appearance of being socketed into a recess. The lateral processes are not widely separated, but the intervals increase slightly from before, backwards; all are provided at their distal extremities with two small spur-like processes; these are dorsal.

The Ocular tubercle is stout, moderately tall, rounded at the apex, and bears four well-developed eyes.

The Proboscis is movably articulated to the body and pyriform in shape, its diameter increases for more than a third of its length, and then enlarges abruptly, and is marked by three double bands, presumably muscle bands, transversely divided near the tip. The mouth is triangular, not large, but with thick lips.

The Chelifori are rudimentary and comprise a stout scape of one joint, which is slightly curved; except for a distal fringe which is not conspicuous, the joint is not setose. The chelæ in the adult are only represented by knobs, and these show the merest traces of two fingers. In younger specimens the chelæ are developed and exhibit comparatively long curved fingers devoid of teeth.

The Palps are nine-jointed and arise at the side of the proboscis. The first joint is short and stout, the proportions of the three following are as 5 : 1 : 4; the remaining five are all short and differ little in size, the first and third are sub-equal, the second and terminal are very little shorter but also sub-equal, the penultimate is the shortest; the last joint is ovoid in shape, setose throughout, the setæ more thickly distributed on its inner margin. The other four joints have slender bases and are much enlarged and densely setose on the inner margin; the outer margin is straight and bears a distal fringe. The preceding joints are also more or less setose, the short setæ beginning near the distal extremity of the second joint and becoming fairly numerous on the fourth.

The Ovigera are ten-jointed and arise ventro-laterally immediately in front of the first pair of lateral processes; they differ in the two sexes. In the male (fig. 1a), the first joint is small and stout, and the proportions of the five following are as 4 : 2·3 : 4 : 4 : 2; the first of these, second of the appendage, is slightly curved; the next is less so, but with the three following forms a large curve, the fifth joint being the only one that is distinctly curved itself. All these joints are setose, particularly on the outer side of the curvatures. The four remaining joints are short; the seventh is articulated at the end of the sixth, but at the side, and makes nearly a right angle with it; near its distal extremity it is provided with a dense tuft of long setæ. The eighth joint is similarly articulated to the seventh, but in the opposite direction, and bears a smaller tuft of long setæ distally; the ninth is the shortest joint. The three terminal joints bear a small number, less than a dozen, of denticulate spines, most of which occur on the terminal joint. They are not in a single row, and consist of a slender shaft with seven closely-set flat teeth on each side.

The oviger of the female is quite different and the articulation of its joints is normal throughout (fig. 1b). The first and third joints are together equal to the second; the fourth and fifth are sub-equal, and the longest on the appendage; the sixth and seventh are a little shorter and sub-equal, the eighth and tenth are again shorter and sub-equal, and the ninth still shorter. Setæ are scarce, and the sixth joint is the only one that can be described as setose. The denticulate spines occur on the four terminal joints, and are exactly like those of the male, but much more numerous, there being upwards of a dozen on each of the joints except the first of the series.

With regard to the Legs, the second coxa is scarcely as long as the other two together; the proportions of the three following joints are as 6·5 : 6 : 7·5;

these joints are subject to variation, but not of great moment, .5 mm. or thereabouts; the tarsus is quite small and cup-shaped, the propodus rather more than a quarter the length of the second tibia. The entire limb is covered with short setæ, but on the second tibia and the propodus there are longer ones interspersed among them. Throughout the entire limb there is a broad lateral band devoid of setæ except for a narrow row of them along its centre; dorsally and ventrally the setæ are abundant, particularly towards the extremity of the limb. The distal fringes are normal and inconspicuous, *i.e.*, indistinct on the first coxa, ventral or chiefly so on the other two, complete on the femur; on the two tibiæ they are best developed ventrally, and become spinous, especially on the second; the tarsus is covered with small spines or spinous setæ ventrally, the propodus has a very prominent heel and bears a stout claw with two well-developed auxiliaries rather more than half its size. The heel bears numerous spinous setæ, and at the proximal end of the joint on its ventral margin there are some half-dozen stout and prominent spines.

The Genital apertures occur on the second coxæ of all the legs in the female, but they can only be found on the two posterior legs of the male. The ova are small and numerous and are carried in a spherical packet round the fourth joint of the oviger.

Several specimens of this species were taken in Winter Quarters at depths varying from 25 to 125 fms., the majority however coming from the latter depth. The specimens vary in age and size, but the species may be regarded as a variable one. While the general arrangement of the setæ remains the same it is not so clear in the young examples. In these the setæ are for the most part long and fine instead of short and comparatively stout; the transition from the one form to the other is gradual, some of the adults retain a goodly proportion of the long setæ among the others. A very few minute setæ may be found on the body in some individuals, especially on the abdomen. In most individuals the summit of the ocular tubercle bears a very short spine instead of being rounded. In the young the chelæ are fairly well developed, they are of moderate size, the fingers being quite smooth and resembling a pair of callipers. The spur-like tubercles on the lateral processes of the adult are, in the young, very prominent spines and frequently bifurcated; similar spines occur on the cephalon. One specimen has the oviger not completely developed and in another the full number of joints is not yet differentiated.

All the adults possess a glandular aperture of some kind on the dorsal surface of the second coxa just beyond the middle of its length.

One individual has the second and third legs of the left side abnormally developed, probably new growths in reparation of injury; one of these limbs does not extend beyond the extremity of the first tibia, the other is longer.

This species very closely resembles *L. clausi* Pfeffer, but may be readily

distinguished by the fact that in that species the abdomen is directed almost vertically upwards, and is situated so far forward that the posterior trunk segment passes over its base, a feature of, possibly, some morphological importance.

LEIONYMPHON SPINOSUM.

(Plate VII., fig. 2.)

Specific characters:—

Body stoutly built, with the transverse ridges not very strongly developed, but with a very prominent spur in the mid-dorsal line. The lateral processes are rather widely separated, and bear distally two stout recurved spurs; smaller ones exist on the first coxæ.

Proboscis short, not half the length of the trunk.

Palps 9-jointed; of the five terminals the seventh and ninth are a little longer than the others.

Oviger 10-jointed, special spines not denticulate.

The entire animal is heavily built, and covered with fine but short setæ. The lateral processes are rather widely separated, the intervals increasing posteriorly, two pairs of processes are directed more or less forward, the other two pairs backward. Each process bears dorsally at its distal extremity a pair of prominent recurved tubercular processes; these are also distinct, though less prominent, on the first coxæ. The body is crossed transversely by three ridges, but these do not extend on to the lateral processes as much as in the allied species. These ridges stand erect, but they are bevelled from behind in the middle line so as to form an acute point of some considerable elevation, and this gives them the appearance of being arched forward.

The Cephalon is not very much expanded, and almost fills the interval between the first pair of lateral processes; in front it bears a pair of tubercular processes directed outwards, one at the base of each of the chelifori.

The Ocular tubercle is just behind the centre of the cephalon and is very stout, taller than any of the transverse ridges, and terminates in a cone above four well-developed eyes.

The Abdomen is not separated from the body by an articulation; it is of normal proportions, elongate, ovate and directed slightly upwards.

The entire body is covered with short, fine setæ, but they appear to be deficient between the ridges, and to some extent on the cephalon. Ventrally the transverse ridges are rounded, and the median spur much less prominent than dorsally; the setæ also are deficient. The length of the body is 13 mm., and its extreme width is 8 mm.

The Proboscis is short and stout, being barely 5 mm in length, cylindrical, slightly swollen in the middle, and movably articulated to the body.

The Chelifori are rudimentary, they lie close together above the proboscis and are more than half its length. The scape is half the length of the proboscis, very slightly enlarged distally and clothed with short setæ; the chelæ are only knobs, also setose, and with but vestiges of the fingers.

The Palps rise laterally below the chelifori and comprise nine joints (fig. 2a). The first joint is short and stout, the proportions of the various joints being: 1·5 : 4 : 1 : 3·5 : 1 : 1 : 1·3 : 1 : 1·5. The entire appendage is covered with fine setæ which become numerous on the fourth joint; on the four following joints they form a dense patch covering the

whole ventral surface, and extending dorsally in a very small degree on the first of these joints but progressively more and more as the extremity of the appendage is approached. The terminal joint is completely covered, but they are most abundant ventrally.

The Ovigera are ten-jointed and rise ventrally in the angle formed by the cephalon and the first lateral process (fig. 2b). The first six joints form the normal double curve and are all more or less covered with small setæ on the outer part of the curvatures. The proportions of the various joints are : 1.5 : 3.25 : 2 : 3 : 3 : 2 : 2 : 2 : 1.5 : 2. The last four joints are provided with a few large spinous setæ forming, on three of the joints, a small irregular group ventrally near the distal extremity ; on the terminal one, which is much the most slender, they are scattered along its length, one of them taking the place of the terminal claw.

The Legs are not all the same size, the third pair being the longest and the first the shortest, their respective lengths being approximately 30 mm., 35 mm., 39 mm., 37.5 mm. The third leg of the right side has been measured. Of the three coxæ the second is longer than either of the other two, the three together attain a length of 8 mm., and the proportions of the other joints are as 9.25 : 9 : 8 : 3.5, the last figure representing the tarsus and propodus together. The entire appendage is densely clothed with rather short but fine setæ having no special arrangement, except that on the femur and first tibia they are not so numerous laterally. The tarsus is small, cuplike, densely setose, but with no strong spines. The propodus is slightly curved, densely setose, and with an oblique termination to the joint, but the process from which the large terminal claw and its two moderate-sized auxiliaries arise projects beyond the joint itself. The ventral margin of the propodus is spinose but varies greatly. In the best instance there is a series of eight spines, the first four are small and then they increase in size rapidly to the last, which is very large. These occupy the proximal half of the joint. Then follows another series of six of nearly uniform size and not so large as the biggest of the previous series. This second series occupies the remainder of the joint and are disposed radially. In other cases the first series is not so well developed and the second is deficient.

The single specimen of this species is an adult female, the Genital apertures are found near the middle of the second coxæ of all the legs.

Taken in 300 fathoms off the Barrier. Bottom : mud. January 27, 1902.

LEIONYMPHON GLACIALE.

(Plate VII., fig. 3.)

Specific characters :—

Body well built, with three very prominent transverse ridges produced to a point in the mid-dorsal line. Lateral processes rather widely separated, and with the stumps of spur-like processes distally.

Proboscis large, but shorter than the body, pyriform.

Palps 9-jointed, the five terminals being sub-equal in size.

Oviger 10-jointed (not mature).

This is a large and comparatively slender species.

The Body is well built with the lateral processes rather widely separated, and traversed by three very prominent pyramidal ridges which conceal the segmentation. These ridges are directed backwards to a very slight extent and excavated posteriorly; it is in the hollow thus formed that the segmental divisions may be seen. Three ridges are equally prominent ventrally, but they are not produced to a median point.

The Cephalon is not very much expanded, and a neck is not noticeable.

The Ocular tubercle is stout, not as tall as any of the three transverse ridges, and bears four well-developed eyes, above which it terminates in a short cone.

The Abdomen is rather long, directed obliquely upwards, not separated from the trunk by an articulation, and terminating in a blunt point. The cephalon bears a small blunt tubercle at its anterior margin on the outer side of the base of the chelifori, a pair of similar tubercles occur dorsally at the extremity of the lateral processes; smaller ones also on the first coxæ with traces of them on the second. The length of the body is 12 mm., its extreme width is 7 mm. The entire body is scabrous, a feature most distinctly noticeable on the transverse ridges and the abdomen.

The Proboscis is large, rather pyriform in shape, and measuring 10 mm. in length. It is movably articulated to the body on a large base, and widens slowly for one-third of its length where it is very slightly constricted; it is then enlarged again, and tapering very slightly, ends in a rather broad round point, the triangular mouth being of moderate dimensions. The proboscis is smooth, and its distal two-thirds are marked by three pairs of longitudinal bands, transversely divided near the tip.

The Chelifori are rudimentary and lie close together above the proboscis. The scape is short, slightly curved and enlarged distally; the chelæ are well developed, as long as the scape, one half of their length is taken up by a bulbous palm; the fingers are slender, quite smooth and much curved, but those of the two appendages are not exactly alike. With the exception of the fingers the entire appendage is scabrous.

The Palps arise laterally just outside the chelifori, and comprise nine joints (fig. 3a). The first is short and stout, the proportions of the second and fourth are as 8 to 11, the third being but little longer than the first; the remaining five are short and sub-equal, the middle one and the last being a trifle the longest, together they scarcely equal the length of the fourth. The fourth joint possesses a prominent tubercle with a glandular opening at two-thirds of its length. The entire appendage is more or less plentifully clothed with very minute spinous setæ; these however are only conspicuous on the ventral margin of the five terminal joints and at the end of the terminal one.

The Ovipositor is ten-jointed and rises ventrally immediately in front of the first lateral process, and appears to be that of a female (fig. 3b). It is not fully developed. The first joint is short and stout, the two following are twice as long and sub-equal, the third having the usual oblique termination. These three joints form a natural

curve in one direction, and the three following curve in another. Measured in their extreme length the proportions of the various joints of the appendage are : 3 : 6 : 6 : 8 : 7·75 : 7 : 4 : 4 : 2·5 : 4. The third and following joints are all more or less covered with very short stout setæ on the outer side of their curvature ; these setæ are most conspicuous on the fourth, fifth, and sixth joints, on the last of which they are also lateral. The last four joints each bear a small number of stout but simple spines, 4 : 8 : 7 : 6, not arranged in a single row. The last joint tapers to a blunt point, and is without a terminal claw, a small group of these spines taking its place.

The Legs attain a length of about 55 mm. Of the three coxæ the second is twice the length of the other two, the proportions of the remaining joints being 13·5 : 12 : 16 : 4, the last figure representing the tarsus and propodus together. The coxæ are densely clothed with very minute setæ, but on the femur they are much larger, though still small, and more conspicuous. They are arranged as a dorsal and a ventral band, separated laterally by a considerable interval, along the centre of which is a narrow band of similar setæ. This arrangement is continued along the tibiæ but it is not so distinct on the second. The distal fringes are quite normal and inconspicuous. The tarsus is a very small cup-like joint, covered with spinous setæ ventrally, with a few prominent ones distally. The propodus is uniformly covered with small spinous setæ, but ventrally there is a row of stout spines running the whole length of the joint. These spines are very irregular ; beginning from the proximal end the first three or four rapidly increase to large dimensions, the rest are very irregular in size, but none are so large as the last of the proximal series. The joint terminates obliquely, the dorsal projection is not large ; the terminal claw is stout, and its two auxiliaries are quite half as long, arising together from a process of the oblique termination.

The single specimen of this species is immature, and was taken in Winter Quarters at a depth of 125 fathoms.

AUSTRODECUS.

Body stout, and distinctly segmented, with lateral processes close together. Ocular tubercle anteriorly situated, long, with four well-developed eyes.

Proboscis immovably articulated to the trunk and ventral in position ; long, tapering, slender.

Chelifori absent.

Palps 6-jointed.

Oviger 6-jointed ? no terminal claw.

Legs short ; genital apertures on the second coxæ of all the legs in female. (Male as yet unknown.)

I have considered the affinities of this and of the succeeding genus in the introduction to this memoir.

AUSTRODECUS GLACIALE.

(Plate VIII., fig. 1.)

Specific characters :—

- Body stout, segmented, with lateral processes close together.
- Proboscis long, tapering and curved near the extremity.
- Chelifori absent.
- Palps 6-jointed ; terminal joint articulated to one side of the penultimate.
- Ovigers 6-jointed ?
- Legs short, first coxæ armed dorsally with two spurs.
- Abdomen long and slender.

This is a diminutive species ; the entire animal does not cover a space 8 mm. square.

The trunk is stout and distinctly segmented ; the lateral processes are not widely separated, but as they are rather short and tapering, the intervals at their distal extremities are very pronounced. The first coxæ, which are the largest, all bear dorsally a pair of stout tubercular spines which are very prominent. Each of the four segments of the trunk bears a stout tubercle of some elevation in the middle line, and close to its posterior border.

The Cephalon is scarcely expanded, and almost fills the interval between the first pair of lateral processes and their first coxæ. Anteriorly it bears a very long Ocular tubercle which is directed obliquely forwards, flask-shaped and truncated at its extremity, on the upper surface of which, in a compact group, are four very well-developed eyes.

From the truncated end of the trunk the Abdomen projects horizontally ; it is rather long and not separated by an articulation. On the ventral surface of the trunk a slightly raised band passes transversely between the first three pairs of lateral processes, with the last pair the band is interrupted in the middle line.

The Proboscis is long and of a peculiar shape, not unlike the snout of a weevil beetle. It is movably articulated to the body, and for about one-third of its length it is not disproportionately slender, then it tapers rather rapidly to a long and very slender structure, curved downwards near the tip. It is quite smooth and presents an annular appearance which is less distinct proximally.

The Chelifori are quite absent.

The Palps are six-jointed and arise above but well to the side of the proboscis (fig. 1b). The first joint is short and very stout, the second is long and extends beyond the extremity of the ocular tubercle. The third is very short and its distal limit indistinct. The fourth joint is rather more than half the length of the second. The second joint bears the stumps of several spinous setæ along its length ; on the fourth joint a similar number of curved spinous setæ occur, and these increase in size to the distal extremity of the joint, which also bears a few finer setæ and a small distal fringe. The last two are quite small and rather densely clothed with small setæ. The last one is articulated to one side, and not at the end, of the penultimate, and the setæ occur mainly on the outer side.

The Ovigera arise ventro-laterally, close to the angle formed by the cephalon and the first lateral process. They are extremely small, and it is open to question whether they are mature or not. As the removal of one of these appendages involves serious risk to the only specimen, it cannot be very satisfactorily described. Not less than six joints can be distinguished, the first three of which are very small. A small body-process from which the appendage arises may be an additional joint. The terminal joint is the longest, it is rounded at the extremity and does not carry any trace of a claw, nor are setæ of any kind discernible.

With regard to the Legs, the first coxa has already been alluded to as the largest of the three, the other two are very little if any shorter, and the second is dilated distally. It is difficult to get the limb in one plane for measurement, and the joints appear subject to some variation. The proportion of the joints appears to be 3.5 : 3 : 2.5 : .5 : 2.5. The femur is stout, and the two following joints decrease in calibre. The limb bears a very few scattered setæ, most numerous on the second tibia. The tarsus is very small and cup-like, with two or three spinous setæ ventrally; the propodus is proportionately long, slightly curved, and bearing a few setæ. On its ventral margin it carries a row of setæ, but there is nothing very distinctive about them. The claw is short and stout, and is accompanied by two slender auxiliaries.

The only example of this peculiar species is a female, and the Genital apertures are found in the middle of the second coxæ of all the legs.

Taken by the dredge in Winter Quarters before the ship was frozen in. Ten fathoms or less.

AUSTRORAPTUS.

Body with spurs on the lateral processes and first coxæ. Segmentation very imperfect.

Proboscis stout at the base, terminating in a point.

Chelifori rudimentary.

Palps 6-jointed.

Ovigera 10-jointed, without terminal claw or denticulate spines.

Legs comparatively long, terminal claw with two auxiliaries.

AUSTRORAPTUS POLARIS.

(Plate VIII., fig. 2.)

Specific characters :—

Body rather stout, with prominent spurs on the lateral processes and the first coxæ.

Proboscis half the length of the trunk, pointed.

Palp 6-jointed, the terminal joint is twice as long as its predecessor, and articulated at an angle to it.

Oviger 10-jointed, without terminal claw or denticulate spines.

Legs long, terminal claw with two small auxiliaries.

The body is rather robust, with long lateral processes which arise close together and diverge considerably. These are provided dorsally with a pair of stout tubercular spines which exist also on the first coxæ, where they are greatly exaggerated.

The Cephalon is considerably enlarged, and almost completely fills the interval between the first pair of lateral processes.

The Ocular tubercle is stout and tall, terminating in a cone above the four well-developed eyes. It lies well to the front of the cephalon.

The Abdomen is long, cylindrical, almost horizontal, and not separated from the body by an articulation. The extreme length and breadth of the trunk is as 6 to 5.5, the abdomen increasing the length to 7.5. The articulation of the trunk is indistinct, that separating the last segment being non-existent. The entire body appears to be perfectly smooth.

The Proboscis is about half the length of the trunk; it lies underneath the cephalon, directed obliquely downwards; it is stout and cylindrical for the greater part of its length, tapering off to a sharp cone. It is movably articulated to the trunk.

The Chelifori are rudimentary; the scape is well developed, stout, not setose, a little longer than the cephalon; the chelæ are reduced to a knob, inclined inwards at an angle of about 45° , with only the merest traces of fingers.

The Palp is short and only possesses six joints. It rises close to the proboscis, below and outside the chelifori (fig. 2a). The first joint is short and stout, and the second is three times as long; the third is again very small and, forming an elbow, is shorter on one side than the other. The fourth is the longest joint, though but little longer than the second, the only setæ visible forming a small distal fringe. The following joint is characteristic; it is small, and its inner margin is just half the length of its outer border; this outer border is well supplied with setæ distally. To the oblique termination of this joint the sixth and last joint is articulated. It is twice the extreme length of its predecessor and richly setose on its outer border and extremity.

The Oviger is 10-jointed and rises ventro-laterally at the angle formed by the first lateral process with the cephalon (fig. 2b). It is a short appendage; the first three joints are short and stout, the second and third are sub-equal in length, but not in diameter, and nearly twice the length of the first; the two following are the longest joints, the fifth being a trifle longer than the fourth and sparingly setose; the sixth is short, the seventh is longer, and the three terminal ones progressively decrease in length and diameter, the last one being very small. The last five joints are sparingly supplied with setæ. On the terminal joint there are three long and stout ones. There is no terminal claw nor are there any special spines. The oviger of the male has not been removed, but does not differ essentially.

The Legs measure some 18 mm. in length. The second coxa is fully as long as the other two together, and is much enlarged distally. The femur and first tibia are sub-equal in length, and the second tibia is a very little longer; the tarsus and propodus together are rather more than one-third the length of the second tibia. The tarsus is very small and cup-like, richly setose ventrally, the setæ being stout, one

especially so. The propodus is very slightly curved and covered ventrally with short spinous setæ, with, proximally, a row of four stout spines. Dorsally the setæ are small and scanty. The terminal claw is large, more than half the length of the joint, and accompanied by two small auxiliaries. These claws arise on a process from the oblique termination of the joint. The extreme end does not project much beyond, and is supplied with numerous spinous setæ. The rest of the limb, coxæ, femur, and tibiæ are fairly well covered with very small setæ; their precise distribution is not easy to observe, but they appear to be deficient laterally; they are most abundant on the second tibia. The lateral line is well marked on the three largest joints.

The specimen above described is an adult female, and shows conspicuous Genital apertures on a swelling at the extremity of the second coxa of all the legs. An adult male shows smaller apertures on the three posterior legs only.

The female was taken in 100 fathoms, rough ground, off the Barrier, in Lat. $78^{\circ} 16' 14''$ S., Long. $197^{\circ} 41' 47''$ E.

The male was taken in 300 fathoms, mud, off the Barrier, in Lat. $71^{\circ} 25' 40''$ S., Long. $185^{\circ} 39' 06''$ E.

RHYNCHOTHORAX.

Rhynchothorax, O. G. Costa, *Microdoride Mediterranea* (1861), p. 7.

I have not seen Costa's original description of this genus or its attendant species. In the 'Challenger' Report (14) it is included by Dr. P. P. C. Hoek in his list of the then known species of Pycnogonida, and at the same time condemned as being insufficiently described. It is not a little remarkable that out of ten species then recorded from the Mediterranean only one is described in Dr. Dohrn's monograph (8). Zoologists are indebted to that author for the careful and full descriptions of the Pycnogonida therein recorded. The genus and species of *Rhynchothorax mediterraneus* Costa are fully described, and differ in many particulars from the original description.

Dr. Dohrn states—

That the Chelifori are absent.

That the Palp is eight-jointed, but that fusion has taken place, reducing the number of distinct joints to five. Five distinct joints are figured, the limits of the remainder being obscure.

That the Ovigera are eleven-jointed. In both figures, however, only ten joints are shown.

I have no hesitation in placing the species described below in the genus *Rhynchothorax* as defined by Dr. Dohrn for these reasons: the general aspect of the animal is similar; the proboscis is cleft at its extremity; though the palps are only five-jointed, the feebly-developed extremity seems to indicate some reduction is taking place; and the ovigera are ten-jointed, and the exact counterpart of those figured by Dr. Dohrn.

RHYNCHOTHORAX AUSTRALIS.

(Plate VIII., fig. 3.)

Specific characters :—

Body very robust, with lateral processes quite close together, and with median tubercles on the segments.

Chelifori absent.

Palps 5-jointed, the second joint with a very strongly developed spur dorsally.

Ovigers 10-jointed, with a terminal claw, the last four joints with a couple of spines on an enlarged base.

Legs short, terminal claw with two small auxiliaries.

Body very robust, with the lateral processes short and quite close together, widest across the first lateral process, and about half the breadth across the last.

The posterior articulation of the trunk is deficient, but immediately in front of where it should be, as on the preceding segments, is a stout median tubercle, bluntly pointed, and very slightly inclined forwards.

The Cephalon is expanded, but very short. The Ocular tubercle, which is stout, projects forwards and upwards over the base of the proboscis. It bears four well-developed eyes, the posterior pair being a little the larger, and terminates above them in a short cone. Measured from the anterior margin of the ocular tubercle, the cephalon is half the length of the first segment of the trunk.

The Abdomen is long, about as long as the two combined segments from which it originates.

Proboscis is stout, conical, a little longer than the first trunk segment. A conspicuous slit marks the mouth as the animal lies in its normal position.

Chelifori, no trace.

Palps. These appendages only comprise five joints, and are very curiously modified (fig. 3a). Each rises at the side of the proboscis and extends but little beyond it. The first joint is short and stout, the second is the longest of the appendage; its dorsal extremity is prolonged forwards and upwards as a stout spur. The third joint is about half as long as the shaft of the second, it is enlarged distally, a stout dorsal tubercle bearing a tuft of setæ; a few other setæ are more scattered. The fourth joint is small and setose, while the fifth, which is also richly setose, is reduced to a mere button.

The Oviger is very slender, ten-jointed, and rises ventro-laterally at the neck (fig. 3a). The first three joints are short, and progressively lengthen, but only to a slight degree. The fourth is nearly as long as the three together. The fifth is shorter, but swollen distally. The sixth is shorter still. No setæ are discernible on any of these joints. Of the four terminals the first three are sub-equal in length, but their dorsal surfaces become more and more curved. Ventrally, also, there are prominent projections which bear the denticulate spines. The terminal joint is very broad, and a little longer than the others; its dorsal outline is very much curved, and ventrally a large swelling occupies almost the whole surface; one small spine is

all that is visible. A prominent claw terminates the appendage. The denticulate spines are few in number, two on each of the first three joints. They are worn, and all that remains is a slender shaft of uniform diameter with three terminal teeth, of which the middle one is the largest.

The Legs are short. The three coxæ are short and stout, the second is by a very little the longest, but the first has nearly twice its diameter; it also bears a tubercle smaller than, but similar to, those borne on the middle line of the trunk. The femur is stout, and not so long as the three coxæ together, but the remainder of the appendage is much more slender. The proportions of the two tibiæ are as 3 to 2, the tarsus and propodus together being as long as the second tibia. The tarsus is a very small joint, its ventral surface being covered with minute spinous setæ. The propodus, which is curved, has a row of them along its ventral margin, separated by rather wide intervals; several setæ are scattered dorsally. The terminal claw is stout and is accompanied by two slender auxiliaries about one-third its size. A few setæ are scattered on other parts of the appendage, but they do not form a prominent feature.

The Genital apertures are distinct on the second coxæ of the last pair of legs only, and this joint is much swollen in consequence.

This species, of which there is only a single specimen, was found by Mr. Kirkpatrick on a sponge. Winter Quarters, at a depth of 178 fm., 7 Aug., 1902.

COLOSSENDEIS.

Body ovoid or elongate, with the lateral processes close together or widely separated, as a general rule without segmentation. Cephalon small. Eyes well developed or absent.

Proboscis very large, often much longer than the body, and movably articulated to it.

Chelifori very rarely present, rudimentary.

Palps very long, 10-jointed, third and fifth joints the longest, more or less setose.

Ovigers very long, 10-jointed, fourth and sixth joints the longest, the last four joints bearing several rows of spines usually dentate. A terminal claw.

Legs without auxiliary claws; the three coxal joints short.

Abdomen of moderate dimensions, movably articulated to the trunk, sub-clavate.

Genital apertures on the second coxa of all the legs.

I defined this genus in comparison with *Decolopoda* in the *Zoologischer Anzeiger* (13), retaining as far as possible the words of Jarzynsky. Certain characters made use of by Professor G. O. Sars (25) have been incorporated, since his definition has become inapplicable in certain important features.

No less than eighteen species and two varieties have been described. Through the generosity of Professor E. L. Bouvier I have been permitted to examine the collection of Colossendeids made by the 'Travailleur' and 'Talisman,' the description of which is not yet published. The identity of these species with the known species, or otherwise, has not yet been fully established, but four new species from the Antarctic Regions are now described.

COLOSSENDEIS AUSTRALIS.

(Plate IX., fig. 1 ; Plate X., figs. 1 and 2.)

Specific characters :—

Body stout, with lateral processes widely separated, minutely scabrous, the spines being arranged in distinct rows on the appendages.

Proboscis enormous, bottle-shaped, more than half as long again as the body. Eyes, four, well developed.

Palp 10-jointed, the eighth and ninth joints equal, the tenth longer.

Claw of legs less than half the length of the propodus.

Under a lens the entire animal exhibits a beautifully mottled appearance, which, to a greater or less extent, appears to be characteristic of the genus. The Body shows the faintest traces of segmentation ; the cephalon is short and only very little expanded, and the first pair of lateral processes is placed close against it.

The Ocular tubercle is situated in the middle of this area and is stout, with four well-developed eyes, two anterior and two posterior, the latter smaller than the others.

The Proboscis is of much greater diameter than the body, to which it is movably articulated ; throughout the greater part of its length it is curved downwards ; the mouth is very large. The organ is covered with minute spines, which seem to have, to some extent at least, an indistinct linear arrangement ; the difficulty of making out their precise arrangement is accentuated by a growth of polyzoa.

The Abdomen is of moderate dimensions and somewhat clavate.

The ten-jointed Palp arises ventro-laterally, as close as possible to the proboscis. The two first joints are very short, and the third is rather more than twice the length of the fifth ; the fourth is small ; the sixth is barely one-third the length of the fifth, and the seventh is about half as long again as its predecessor ; the eighth and ninth are shorter and sub-equal ; the terminal one is absent from one side and injured on the other, but in the other specimen available it is a little longer. The lateral line appears along the greater part of the appendage. The entire limb is spinose, beginning with the third joint, and the minute spines are arranged longitudinally in rows as far as the end of the fifth joint, which, with the two preceding, bears a more or less complete whorl of spines at its distal extremity. Beyond the fifth joint the spines become stiff setæ rather than spines ; they are larger and more abundant and irregular, besides being aggregated on the ventral and inner side in the natural position of the limb.

The Ovigera are very long and, as characteristic of the genus, 10-jointed (fig. 1a). They arise from a small body-process immediately behind the palps, but nearer the middle line. The first three joints are small, the fourth and sixth are the longest and sub-equal, the fifth being about a quarter their size. The last four are sub-equal, and the appendage terminates in a small claw. The lateral line is distinctly marked. The entire limb is spinous. A few minute spines exist on the first three joints, beyond these they are arranged more or less clearly in lines and are more numerous. There is also a fringe of small spines on the outer margin of the distal extremity of each

joint, but these are either inconspicuous or absent on the four terminal joints. With regard to the characteristic groups of spines on the four terminal joints, there are four rows on the three proximal joints and three only on the terminal joint. In both specimens the spines are so much worn as to give but a feeble idea of their true character (Plate X., figs. 1 and 2). The large size of the sockets in which they are planted is remarkable. The most ventral row, that which lies nearest the sea bottom in the natural position of the animal, comprises a small number, less than a dozen, of large stout spines. The second row, which in this species is not separated from the first by any conspicuous interval, contains approximately double the number of smaller spines; the sockets of this row are sometimes crowded together, and the spines are smallest and most crowded at the proximal end of the joint, and are also deflected from a straight line by the articulation of the succeeding joint. Two other rows follow, but these have not the mathematical regularity of the former, nor are they so much deflected; they are reduced in number, but not in size. In structure the large spines appear to consist of a stout base almost circular in section and composed of a strong chitinous investment having a protoplasmic core; the spine tapers to a blunt point much worn, but with enough left to indicate a flattened blade at the extremity.

The Leg attains a length of 115 mm. The three coxæ may be regarded as sub-equal in size, and short. The two tibiæ are the longest joints and sub-equal, except in the first leg, where the second tibia is a trifle shorter than the first. The femur is a little shorter, and the tarsus less than half the length of any of the three preceding joints; the propodus is just over half the length of the tarsus. On the first coxa there is dorsally and ventrally a median line of reddish colour, which appears to indicate the presence of a slight groove. On the second coxa the lateral line begins on each side of the joint, and passes to the extremity of the limb. The three coxæ are minutely scabrous and possess a small fringe of minute spines at their distal margins. The remaining joints are more or less covered with these fine spines, which become a little more conspicuous as the extremity of the appendage is reached. Six rows are fairly well defined throughout the limb, a median dorsal, a median ventral, and two lateral, one on each side the so-called lateral line. The distal extremity of each joint bears a fringe of spines on the inside of the bend, largest and most conspicuous on the second tibia. The terminal claw is small, less than half the length of the propodus.

The Genital apertures occur on the second coxa of all the legs in both sexes, as shown in figs. 1b and 1c.

The above description has been prepared from an example taken in deep water. Another from shallow water presents certain differences: first, it is more spinose, especially the proboscis and the limbs; on the legs four additional irregular rows of spines may be distinguished between the six described for the deep-water specimen, two of these are dorsal and two ventral: and secondly, in the comparative length of

certain joints. The third joint of the palp is distinctly less than twice the length of the fifth, and the fourth joint of the ovigerous leg is a little longer than the sixth.

The nearest ally of this species seems to be *C. proboscidea*, Sabine, from which, however, it may be instantly recognised by the wider intervals between the lateral processes and the presence of well-developed eyes.

Two specimens of this species were taken, one off Cape Wadworth, Coulman Island, 8-15 fm.; bottom : stones ; the second off Mounts Erebus and Terror, 500 fm.; bottom : stones.

This latter specimen is the carrier of some half-dozen cirripedes of the genus *Scalpellum*.

COLOSSENDEIS GLACIALIS.

(Plate IX., fig. 2 ; Plate X., figs. 3 and 4.)

Specific characters :—

Body apparently smooth, with lateral processes widely separated, and four well-developed eyes.

Proboscis not quite so long as the trunk, slightly dilated about the middle, and covered with short spinous setæ.

Palps, three terminal joints sub-equal and densely setose, with wide and deep constrictions at the joints.

The body is rather stouter proportionally than the last two species, and though apparently smooth, a lens reveals a median row of extremely minute setæ.

The Cephalon is not expanded beyond the average width of the body.

The Ocular tubercle is stout, and bears four eyes, the anterior pair larger than the posterior ; the portion above the eyes is acutely pointed, but this feature is variable in size. The setous character of the proboscis is not always easily discernible ; in one specimen it is prominent, in others less so, even when not concealed by a growth of polyzoa. It can hardly be said that these setæ are arranged in any definite manner, but in places they give the impression of ill-defined rows.

The Abdomen is short and articulated to the trunk. The Proboscis is as defined among the specific characters and flexibly united to the trunk.

The Palps arise on the ventral side of the proboscis (fig. 2) ; the first joint is rather more prominent than usual, and is readily seen from the dorsal surface. The second joint is shorter, the third is considerably the longest of the appendage, the fourth is quite short, and the fifth is approximately two-thirds the length of the third ; this joint has a faint constriction at about two-thirds of its length. The following joint is short, the next a little longer, the three terminal joints being short and sub-equal. The extremity of the palp has a peculiar appearance, owing to the seventh, eighth, and ninth joints, and to a less extent the sixth, having their distal extremities rounded off like the shoulders of a wide-mouthed bottle, so that each joint seems balanced on a narrow base. The entire appendage is beset with stiff setæ, almost spinous in character. On the third joint they are short, somewhat sparsely distributed, and appear to be arranged in rows. A whorl of stouter setæ (spines ?)

surround the distal extremity of this joint and the next; beyond this the setæ are so thickly distributed that it is scarcely possible to make out any definite arrangement. On the fifth joint some of the setæ are distinctly longer than the majority, and from this joint the setæ on the inner side of the appendage, in its natural position, are much the longest.

The Ovigera arise immediately behind the palps on a conspicuous body-process close to the middle line (fig. 2a). The first three joints are small, and bear spinous setæ of small size. The fourth and sixth are very long and sub-equal, the fifth being not more than a quarter of their length. The four terminal joints are sub-equal in length, but decrease in stoutness. The entire appendage is setose. On the fourth joint the setæ are small and arranged in rows, and on the outer margin, at about two-thirds of its length, a small but distinct, rounded protuberance occurs. On the succeeding joints the setæ or spines, whichever they may be called, are more thickly distributed. The characteristic spines of the four terminal joints present very slight differences from the two preceding species. On the ventral side of the limb in its natural position are two rows of these spines separated by a conspicuous interval; the more ventral of these two rows consists of a few large spines, the other contains approximately double the number of smaller spines. Dorsally, and separated by an interval, are two rows of smaller spines, which are not, however, arranged with such precision as the others. Close examination reveals the fact that the intervals between the rows of spines are more apparent than real, this effect being due to the set of the first two rows and the third group or double row; the second row is deflected at the extremity by the articulation of the succeeding joint. The spines do not present any special peculiarities, being more like true spines than in the other species here described. They are somewhat curved or falciform (Plate X., fig. 3). The terminal claw is of moderate dimensions, rather slender, but with a stout base; in most of the specimens the stout base is all that is left. All four terminal joints are dorsally covered with short spinous setæ set in sockets (Plate X., fig. 4). In this species they are much more numerous than in the other three.

Concerning the Legs, the first coxa has a slightly greater diameter than the others, and bears the dorsal and ventral mark so characteristic of the genus. The other two coxæ are nearly equal in length and all are minutely spinose. The Genital apertures occur on the second coxæ of all the limbs, and the lateral line beginning on that joint is conspicuous to the end of the limb. The first tibia is the longest joint of the limb, the femur is very little shorter, the second tibia approximates to three-quarters the length of the first, and the tarsus to very nearly half its length; the propodus is shorter than the tarsus by nearly a third, and the claw is less than half the length of the propodus. The entire limb is covered with minute setæ, which, along the dorsal surface at any rate, have a distinct linear arrangement; ventrally this becomes indistinct from the second tibia onwards. The distal extremity of each joint, including the coxæ, is more or less completely girdled with spines, minute up to

the extremity of the femur, and most numerous dorsally; on the first tibia they increase in size ventrally, and still more so on the second tibia; on the tarsus and propodus the ventral setæ are comparatively long and conspicuous.

The specimen from which the above description was taken seemed to be an exceptionally spinose individual. Seven specimens were obtained, and in the other six all the features described above can be seen, though to a less degree, when not concealed by a growth of polyzoa.

Winter Quarters, 12 to 25 fathoms.

COLOSSENDEIS FRIGIDA.

(Plate IX., fig. 3; Plate X., figs. 5 and 6.)

Specific characters:—

Body smooth, with lateral processes widely separated. Four well-developed eyes.

Proboscis approximately twice the length of the trunk, dilated about the centre and quite smooth.

Palps, 10-jointed; eighth joint half the size of the two terminals, which are sub-equal.

Ovigera, with a group of four or five irregular rows of special spines in addition to the two primary rows.

Claws of legs about half the size of the propodus.

This last character, together with the spines and terminal claws on the ovigera, readily separate this species from *C. megalonyx*, to which it appears very closely related.

A considerable amount of latitude must be allowed on the proportions of the joints of the various appendages as a guide to specific discrimination. Thus the proboscis varies in length from 11 mm. to rather more than 21 mm., and the trunk to the base of the abdomen, from rather less than 6 mm. to rather more than 11 mm., but the longest proboscis does not coincide with the longest body. The same sort of variation occurs throughout.

There is no trace of segmentation in the trunk, and the Proboscis is articulated to it, hence the variation of the angle to which it may be inclined.

The Ocular tubercle is stout, sharply conical above the eyes, which are well developed and four in number.

The Abdomen is quite small and articulated to the trunk.

The Palps are ten-jointed. The third joint is much longer than the fifth, which reaches almost to the extremity of the proboscis. The fourth joint is very small, and the seventh is slightly longer than the sixth; the eighth is quite short, the two terminals being twice its size and sub-equal. Towards the extremity of the fifth joint very minute setæ make their appearance, and on the rest of the appendage they are scattered in more or less definite rows.

Ovigera: These appendages arise close to the middle line behind the palps (fig. 3). The first three joints are very small, the fourth and sixth long and sub-equal, the sixth as a rule extending beyond the proboscis. The fifth joint is about half the length of the sixth. The four terminal joints are sub-equal, and the claw has a peculiar appearance, as if the inner margin had been bevelled off at a very acute

angle. In its perfect condition it is rather long and slender, especially the distal half. Something like one-half of this slender portion, at the tip of the claw, is flattened dorso-ventrally to form a sort of protective shield to a thin membranous fold lying like a knife-edge on the under surface of the claw throughout its distal half (fig. 3a). The claw is covered with very minute hairs. The characteristic spines are very numerous, and are arranged in two sharply defined lines followed by a closely arranged group in which five rows can be distinguished. A distinct interval separates the first two rows from each other and from the group referred to above. The spines of the first row are long, slender, lanceolate in shape, and set as closely together as possible (Plate X., figs. 5 and 6). Those of the second row are approximately double in number, shorter and more spatulate, their essential structure being the same. They have a fairly stout base tapering to the centre, where it becomes a flat blade, the entire margin of which is provided with minute teeth visible under a one-inch objective. In the group of spines there are five rows arranged in an imbricate manner and as the spines of these rows alternate fairly regularly oblique rows of eight spines may be distinguished in the broadest part of the group. In structure they resemble those of the second row. *Setæ* are sparsely distributed over the appendage and though very minute they are not difficult to distinguish.

The legs of the numerous specimens average between 58 mm. and 106 mm. in length; the proportions of the joints do not, however, vary greatly. The first coxa bears a reddish line marking a very shallow groove dorsally and ventrally; the lateral line begins on each side of the second coxa, and is continued to the extremity of the limb. The three coxæ are sub-equal. The femur is the largest joint of the limb as a rule, the other joints decreasing in size to the extremity. The claw is about half the length of the propodus.

The Genital apertures occur on the second coxa of all the limbs of both sexes. The legs are apparently quite smooth, even to the touch, but close examination shows faint traces of rows of *setæ*. In some of the larger specimens these are a little more conspicuous.

Specimens of this species were taken in Winter Quarters in depths varying from 5 to 178 fathoms, and the name is derived from the fact that two of them had to be taken to the ship dry, a distance of nearly two miles, at a temperature of -50° Fahr. They suffered in consequence. Another specimen taken in 300 fathoms; bottom, mud; off the Barrier, 27.1.02, is referred to this species.

COLOSSENDEIS RUGOSA.

(Plate IX., fig. 4; Plate X., fig. 7.)

Specific characters:—

Proboscis half as long again as the body, slender, dilated about the middle, with a median row of curved spines dorsally along the proximal half.

Body smooth, with lateral processes widely separated, and, with the first coxa, dilating distally.

Palps 10-jointed, the eighth very short; the ninth rather more than twice its length; the terminal one a little larger still.

Legs provided with rows of spines, claw large.

This species in general appearance very closely resembles the last, but may be readily distinguished by its spiny character and the features quoted above.

The Body is quite smooth, the cephalon short and without any constriction indicating a neck.

The Ocular tubercle is stout, with four well-developed eyes, the anterior pair being larger than the posterior pair. Above the eyes the tubercle is acutely conical.

The Proboscis is half as long as the body as indicated in the specific characters, and besides the median row of spines there is a lateral row of a few, widely separated. The proboscis is movably articulated to the body, and obtusely pointed distally.

The Abdomen is small, somewhat clavate, but presenting no special feature.

The Palps arise on the ventral side of the body, as close as possible to the proboscis. They arise on a process of the body which is usually regarded as the first joint, but which has always appeared to me to be doubtful whether it is a real joint or not. In this particular species it is definitely a body-process and not a true joint. The succeeding joint, here as elsewhere called the second, is very short, a mere ring-like segment. The third is considerably the longest joint of the appendage, slender and furnished with a few prominent curved spines; the fourth is quite small; the fifth is two-thirds the length of the third; and a short distance from the distal extremity there is a distinct constriction as though there had been a joint there and it had fused; the sixth is short, and the seventh is about half as long again; the eighth joint is very short, scarcely half the length of the sixth; the ninth is fully twice the length of the eighth, and the terminal one a little longer, rounded at the extremity. From, and including the fourth joint, the entire organ is covered with minute spines, too plentifully distributed to assert any regular disposition.

The Ovigera arise laterally from two body-processes close to the middle line and immediately behind the proboscis (fig. 4). The first three joints are very small and sub-equal in length; the fourth and sixth are very long and sub-equal, the fifth being about one-third of their length; of the four terminal joints, the proximal is the largest. The claw is of moderate dimensions. The entire appendage is covered with very minute spines, which become numerous from the fourth joint, and appear to be very generally distributed. The characteristic spines of the four terminal joints are limited to four rows with an occasional small spine which may perhaps be regarded as the remnant of a fifth row. It is unfortunate that in the only specimen obtained (Plate X., fig. 7) these spines are very much worn. An interval separates the two first rows, and another interval separates the second row from the remainder.

The spines of the first row are long, slender and few in number. They have a somewhat stout base which, as far as can be judged without cutting sections, appears to be rounded on one side and flattened or somewhat concave on the other; they are constricted in the middle, and produced onwards as a flat blade with dentate margins. The spines of the second row are smaller, twice the number, and placed as

close together as possible. In both these rows the spines are set at right angles to the joint, in the other rows they are arranged parallel to the length of the joint. All these are essentially the same in character, but in the "parallel" series, the spines, being viewed more laterally, appear to be curved and the blade forms a very shallow scoop.

The Legs are provided with longitudinal rows of curved spines, not very numerous, especially on the ventral surface, most abundant and conspicuous on the femur. The first coxa is conspicuously broader than the others. The lateral processes of the body are narrow proximally and widen distally, the first coxa continuing this widening. The two following coxæ are of less diameter, sub-equal in length, the distal extremity of each is fringed with minute spines, the fringe, however, not being complete. The femur is conspicuously the longest joint of the limb, the other joints progressively shorten, the amount of decrease being obvious. The claw is nearly the length of the propodus. A few additional spines are to be found ventrally at the distal extremity of some of the joints.

The Genital apertures open on the second coxa of each leg.

A single specimen of this species was taken off the Barrier in lat. $78^{\circ} 25' 40''$ S., long. $185^{\circ} 39' 6''$ E., 300 fms., bottom, mud, 27 Jan. 1902.

In the examination of this collection my thanks are primarily due to the Council of the Marine Biological Association of the United Kingdom, and to Dr. E. J. Allen, the Director, for accommodation at their Plymouth Laboratory; to Professor Chilton, of Canterbury College, Christchurch, N.Z., for enabling me to make the preliminary examination of our collections; to Mr. G. M. Thomson and Professor W. B. Benham, of Dunedin, N.Z., for so kindly placing the whole of their collections at my disposal; to Professor E. L. Bouvier, of Paris, for allowing me to examine the collection made by the 'Français' in the Antarctic as well as the unpublished collections of the 'Travailleur' and 'Talisman'; to Professor Kraepelin, and particularly to Dr. G. Pfeffer, for the opportunity to examine the collection from South Georgia, now in the Natural History Museum at Hamburg; to Professor A. Brauer, and especially to Dr. E. Vanhöffen, biologist of the 'Gauss,' for the facilities extended to me during the examination of the 'Valdivia' and other collections now in the Berlin Museum.

My best thanks are due to Mrs. L. E. Sexton for the drawings of Plates VI. and IX., Plate II., Fig. 1., Plate V. (the entire animal), Plates X., Figs. 1-7, all of which were executed with the greatest accuracy. I am further indebted to her for some considerable assistance during the progress of the work.

Messrs. West, Newman and Co. have continued the preparation of the plates, and I must thank them for the care they have taken.

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EXPLANATION OF THE PLATES.

PLATE I.

- FIG. 1.—*Phoxichilus australis*. ♀ × 2.
 2.—*Pseudopallene australis*. ♀ × 3.
 2a.—Oviger, five terminal joints. ♀ × 20.
 2b.—Denticulate spine from tenth joint. × 880.
 3.—*Pseudopallene cornigera*. ♀. Oviger, five terminal joints. ♀ × 20.
 3a.—Denticulate spine from eighth joint. × 530.
 4.—*Pallenopsis hiemalis*. ♀ × 3.
 4a.—Oviger, six terminal joints. × 27.

PLATE II.

- FIG. 1.—*Pallenopsis villosa*. ♀ × 3.
 1a.—Chela. × 18.
 1b.—Oviger. × 10.
 2.—*Pallenopsis pilosa*. ♀ Hoek. Oviger, five joints, terminal one missing. × 22.
 3.—*Pallenopsis hiemalis*. ♀. Terminal joints of leg. × 12.
 3a.—Specimen from Cape Wadworth. Terminal joints of legs. × 12.

PLATE III.

- FIG. 1.—*Nymphon hiemale*. ♂ × 2.
 1a.—Palp. × 14.
 1b.—Oviger, five terminal joints. × 16.
 FIG. 2.—*Nymphon lanare*. × 3.
 2a.—Palp. × 14.
 2b.—Oviger, five terminal joints. × 13.
 FIG. 3.—*Nymphon adareanum*. ♂ × 8.
 3a.—Palp. × 70.
 3b.—Oviger, five terminal joints. × 80.
 FIG. 4.—*Nymphon frigidum*. × 10.
 3a.—Palp. × 56.
 3b.—Oviger, five terminal joints. × 60.

PLATE IV.

- FIG. 1.—*Chaetonymphon villosum*. × 4.
 1a.—Palp. × 17.
 1b.—Oviger, five terminal joints. × 17.
 FIG. 2.—*Chaetonymphon biarticulatum*. ♀ × 3.
 2a.—Palp. × 27.
 2b.—Oviger. × 16.
 FIG. 3.—*Chaetonymphon mendosum*. ♀ × 4.
 3a.—Palp. × 20.
 3b.—Oviger. × 32.
 FIG. 4.—*Chaetonymphon australe* var. *austrinorum*. ♂ × 3.5.
 4a.—Palp. × 14.
 4b.—Oviger. × 13.

PLATE V.

FIG. 1.—*Pentanymphe antarcticum*.1a.—Palp. $\times 27$.1b.—Oviger. $\times 40$.1c.—Denticulate spine from eighth joint. $\times 630$

PLATE VI.

FIG. 1.—*Leionymphon grande*. ♀ $\times 2$.1a.—Oviger $\times 4$.1b.—Third leg, terminal joints. $\times 8$.1c.—Right oviger of immature specimen. $\times 4$.1d.—Right oviger of immature specimen. $\times 4$.1e.—Right oviger of immature specimen. $\times 10$.1f.—Right oviger of immature specimen. $\times 10$.FIG. 2.—*Leionymphon minus*. $\times 2$.2a.—Oviger. ♀ $\times 10$.2b.—Oviger. ♂ $\times 10$.2c.—Denticulate spine from joint of oviger. ♂ $\times 265$.

PLATE VII.

FIG. 1.—*Leionymphon australe*. ♀ $\times 3$.1a.—Oviger, five terminal joints. ♀ $\times 30$.1b.—Oviger, five terminal joints. ♂ $\times 23$.FIG. 2.—*Leionymphon spinosum*. ♀ $\times 2$.2a.—Palp, five terminal joints. $\times 20$.2b.—Oviger, five terminal joints. $\times 20$.FIG. 3.—*Leionymphon glaciale*. ♀ $\times 1.5$.3a.—Palp, five terminal joints. $\times 11$.3b.—Oviger, six terminal joints. $\times 11$.

PLATE VIII.

FIG. 1.—*Austrodecus glaciale*. ♀ $\times 15$.1a.—Lateral view of body without appendages. $\times 15$.1b.—Palp. $\times 56$.FIG. 2.—*Austroraptus polaris*. ♀ $\times 5$.1a.—Palp. $\times 40$.1b.—Oviger. $\times 31$.FIG. 3.—*Rhynchothorax australis*. $\times 15$.Palp. $\times 72$.Oviger. $\times 88$.

PLATE IX.

FIG. 1.—*Colossendeis australis*. ♀ $\times 1$.1a.—Oviger, four terminal joints. $\times 4$.

1b.—Outlines of second coxa showing sexual aperture. ♀

1c.—Outlines of second coxa showing sexual aperture. ♂

FIG. 2.—*Colossendeis glacialis*. Palp, terminal joints. $\times 8$.2a.—Oviger, four terminal joints. $\times 8$.FIG. 3.—*Colossendeis frigida*. Oviger, four terminal joints. $\times 8$.3a.—Terminal claw of Oviger. $\times 265$.FIG. 4.—*Colossendeis rugosa*. Oviger, four terminal joints. $\times 8$.

PLATE X.

Colossendeis.

- FIG. 1.—*C. australis*. Special spine from eighth joint of Oviger. Principal row. $\times 100$.
2.—*C. australis*. Special spine from eighth joint of Oviger. Second row. $\times 100$.
3.—*C. glacialis*. Special spine from eighth joint of Oviger. Much worn. $\times 265$.
4.—*C. glacialis*. Seta from dorsal surface of ninth joint of Oviger. $\times 265$.
5.—*C. frigida*. Special spine from tenth joint of Oviger. Principal row. $\times 265$.
6.—*C. frigida*. Special spine from tenth joint of Oviger. Second row. $\times 265$.
7.—*C. rugosa*. Special spine from tenth joint of Oviger. Principal row. $\times 265$.

Nymphon.

Denticulate spines from tenth joint of oviger.

- FIG. 8.—*N. hiemale*. $\times 350$.
9.—*N. lanare*. $\times 455$.
10.—*N. frigidum*. $\times 645$.

Chaetonymphon.

Denticulate spines from oviger.

- FIG. 11.—*C. villosum*, seventh joint. $\times 438$.
12.—*C. biarticulatum*, tenth joint. $\times 630$.
13.—*C. mendosum*, tenth joint. $\times 410$.
14.—*C. australe*, tenth joint. $\times 480$.
15.—*C. australe* var. *austrinorum*, tenth joint. $\times 512$.

Note.—The magnifications of Messrs. West, Newman & Co.'s drawings are approximate only. The drawings were made on squared paper, with the assistance of an eyepiece micrometer, and in many cases have been reduced to fit the plates.

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1. *P. villosa*. *Pallenopsis* 2. *P. pilosa*. 3. *P. hiemalis*.



Nymphon.

- | | |
|------------------|------------------|
| 1. N. adareanum. | 3. N. adareanum. |
| 2. N. larare. | 4. N. frigidum. |



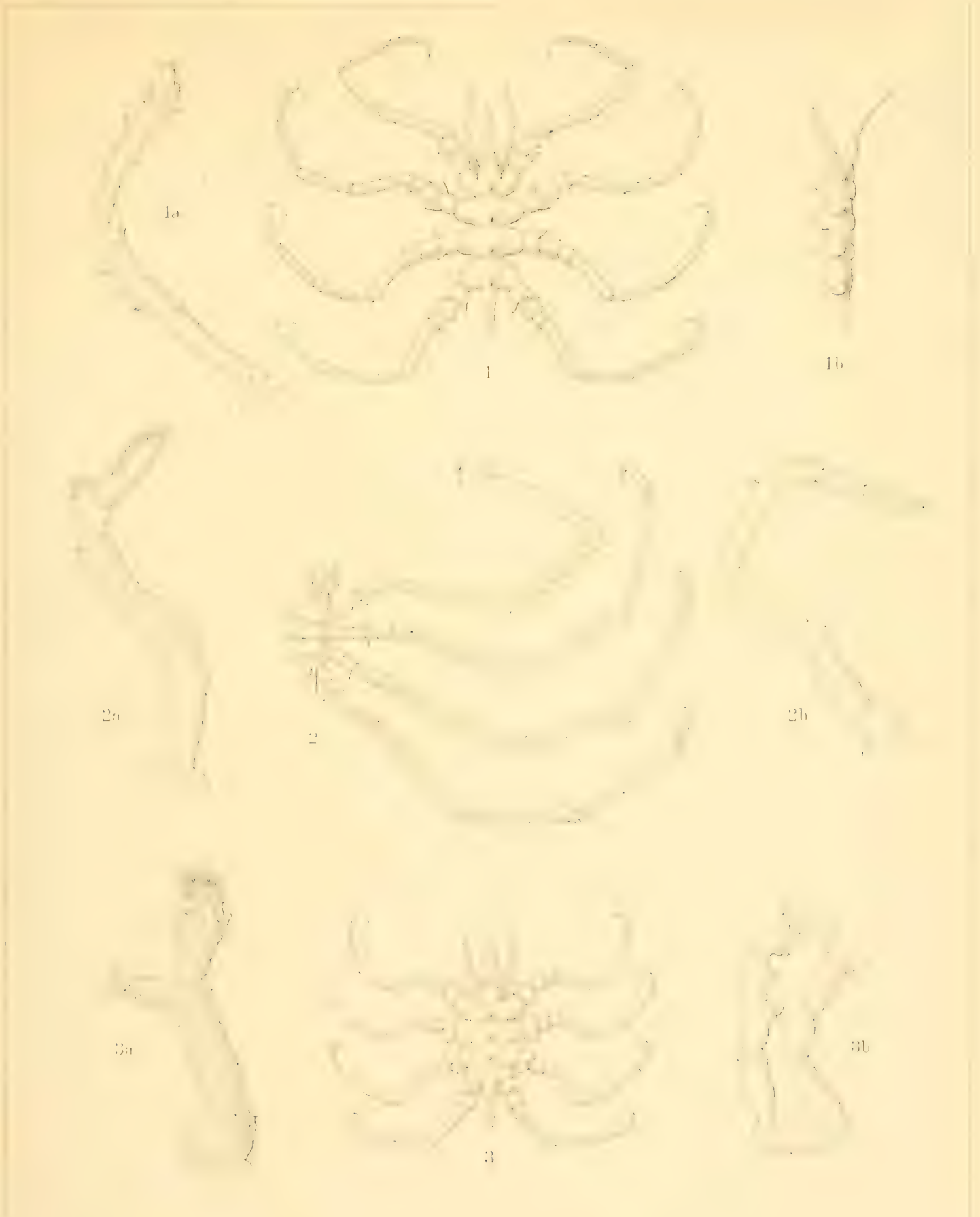
Chætonymphon.

- | | |
|-------------------------|------------------------------|
| 1. <i>C. villosus</i> | 2. <i>C. biarticulatus</i> . |
| 3. <i>C. mendosus</i> . | 4. <i>C. austrinorum</i> . |

West, Newman del et lith.



Fig 1 P.W. Section del



West, Newman del. et lith.

1. *Austrodecus glaciale*. 2. *Austroraptus polaris*. 3. *Rhynchothorax australis*.



West, Newman, Phil.

Colossendeis.

1. *C. australis* 2. *C. glacialis* 3. *C. frigida* 4. *C. rugosa*.



W. Buxton del.

Figs 8-15 West, Newman del et lith.

Figs 1&2. *Colossendeis australis*. Figs 3&4. *C. glacialis*. Figs 5&6. *C. frigida*. Fig. 7. *C. rug*

Fig. 8. *Nymphon hiemale*. Fig. 9. *N. lanare*. Fig 10. *N. frigidum*.

Fig 11. *Chætonymphon villosum*. Fig. 12. *C. biarticulatum*. Fig. 13. *C. mendosum*.

Fig 14. *C. australe*. Fig. 15. *C. austrinorum*.

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